A STUDY OF JOB STRAIN AND DEPRESSION IN LABORATORY TECHNICIANS IN HOSPITAL UNIVERSITI SAINS MALAYSIA AND KEMENTERIAN KESIHATAN MALAYSIA HOSPITALS, KELANTAN

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ABBREVIATIONS

ANCOVA	-	Analysis of Covariance
CVD	-	Cardiovascular Disease
EU	-	European Union
hr	-	Hour
HUSM	-	Hospital Universiti Sains Malaysia
ILO	-	International Labor Organization
JCQ	-	Job Content Questionnaire
KKM	-	Kementerian Kesihatan Malaysia
mth	-	Month
NIOSH	-	National Institute of Occupational Safety and Health
P-E	-	Person-Environment
RM	-	Ringgit Malaysia
SPSS	-	Statistical Programme for Social Science
US	-	United States of America
WHO	-	World Health Organization
χ^2	-	Chi-square
yr	-	Year

GLOSSARY

Constraints:	Forces that prevent individuals from doing what they desire.
Decision latitude:	A freedom of making decision at the workplace.
Depression:	A range of experiences from a slightly noticeable and temporary mood decrease to a profoundly impaired and even life-threatening disorder; and in this study the depression is job related.
Job description:	An outline of a specific job including the experience and ability of the successful applicant, as well as the work condition, pay and benefit of the job.
Laboratory technician:	People who work in the laboratory and perform most of the test in the detection, diagnosis and treatment of diseases.
Strain:	Indicating excessive tension in a muscle or nerve unit, usually due to an activity overload, or in psychological adjustment, usually due to an emotional overload, intellectual overload or both.
Stress:	A state of physical or psychological strain which imposes demands for adjustment upon the individual.
Stressor:	The agents or demands that evoke the patterned response (i.e. any external or internal stimulus).

ABSTRACT

A Study of Job Strain and Depression in Laboratory Technicians in Hospital Universiti Sains Malaysia (HUSM) and Kementerian Kesihatan Malaysia (KKM) Hospitals, Kelantan

Job strain is the harmful physical and emotional responses that can happen when there is a conflict between job demands on the employee and the amount of control an employee has over meeting these demands. Job-related depression may often be initiated by high levels of long-term job stress, failure associated with stress-related under-performance, or by life crises. Job-related depression is a clinical illness and the workers should take this seriously. This study is aimed at identifying the psychosocial characteristics of job strain and the relationship between psychosocial job factors and depression in laboratory technicians in HUSM and KKM Hospitals. A cross-sectional study of 84 laboratory technicians in HUSM (response rate 82.4%) and 71 in KKM Hospitals (response rate 89.9%) was conducted from June 2001 till February 2002. Seven KKM Hospitals in Kelantan - Hospital Kota Bharu, Hospital Pasir Mas, Hospital Pasir Puteh, Hospital Tumpat, Hospital Tanah Merah, Hospital Machang, and Hospital Kuala Krai were chosen. Karasek's Job Content Questionnaire (Malay Version) was used as research instrument in this study. There were five scales in the questionnaire; two scales were used to define job strain – decision latitude and psychological demands.

Results showed that the majority of laboratory technicians in HUSM and KKM Hospitals were classified as passive. However, the proportion of high strain group was the second highest after passive group in both HUSM and KKM Hospitals. The percentage of laboratory technicians in HUSM which was classified as having a high job strain was higher compared to those in KKM Hospitals (33.3% and 26.8%, respectively).

The results showed that job insecurity, physical exertion, and total psychological stressor are the significant risk factors of job strain in laboratory technicians in HUSM. However, the significant risk factors of job strain for laboratory technicians in KKM Hospitals are physical exertion and total psychological stressor.

Laboratory technicians in HUSM had significantly higher depression as compared to those in KKM Hospitals (59.5% and 39.4%, respectively). We also found significant associations between the risk factors of depression and low social support, and high psychological demands (OR 3.0, 95% CI 1.0-8.8) in laboratory technicians in HUSM. However, for laboratory technicians in KKM Hospitals, the significant association was between depression and low social support and low decision authority (OR 9.7, 95% CI 1.0-91.1). The results of multiple logistic

regression analysis revealed that low social support was highly associated with depression in laboratory technicians in HUSM and KKM Hospitals.

We therefore conclude that physical exertion and total psychological stressor in the workplace posed significant risk of job strain in laboratory technicians in HUSM and KKM Hospitals. Job insecurity also significantly affected job strain in laboratory technicians in HUSM. A higher proportion of laboratory technicians in HUSM experienced depression compared to those in KKM Hospitals. Low social support positively predicted depression in laboratory technicians in HUSM and KKM Hospitals. In addition, high psychological demand also significantly predicted depression in laboratory technicians in HUSM; however, in laboratory technicians in KKM Hospitals, low decision authority was the significant predictor of depression.

Key words: job strain, job-related depression, laboratory technicians, HUSM, KKM Hospitals, psychosocial job factors, Karasek's Job Content Questionnaire (Malay version), psychological demands, decision latitude, social support

CHAPTER ONE
INTRODUCTION

Stress is an increasingly important occupational health problem and a significant cause of economic loss (LaDou, 1997). The issue of job stress is of utmost importance to the public health community and working people and the economic costs of job stress in general are difficult to estimate but could be as high as several hundred-billions/per year (Schnall, 1998). Occupational stress may produce both overt psychological and physiological disability; however, it may also have more subtle manifestations that can affect personal well-being and affect outcomes of organizational importance such as productivity (LaDou, 1997). One of the reasons that job stress has been receiving so much attention of late is that businesses are genuinely beginning to care about employee welfare. Worldwide, the International Labor Organization has estimated that job stress costs employers more than $200 billion a year. These costs include salaries for sick days, costs of hospitalization and outpatient care, and costs related to decreased productivity (Greenberg, 1999). According to Karasek and Theorell (1996), occupational stress is currently one of the most costly occupational health issues.

A study by the Northwestern Life insurance Company found some startling statistics pertaining to job stress. Seventy percent of workers reported that job stress resulted in frequent health problems and that it lowered their productivity. Thirty-four percent of these workers thought seriously about quitting their jobs because of worksite stress, seventeen percent said they were absent frequently because of job stress, and thirty-four percent thought they would burn out on the job within a year or two (Greenberg, 1999).

There is also a common concern on job stress among post-industrialized countries, including issues related to gender, work and family, underemployment, worker compensation and others. Reports from the U.S. say that 40% of workers reported their job was very or extremely stressful; and 29% of workers felt quite a bit or extremely stressed at work. Job stress is one of the most common work related health problems in the EU countries; the Second European Survey on Working Conditions (1996) showed that 28% of workers felt that their work causes stress. An increased risk of work-related diseases and accidents has been observed in Southeast Asian countries which have experienced rapid

industrialization. Karoshi (death from overwork) is now a social issue in Korea, as well (Haratani and Kawakami, 1999).

Similarly in Japan, the Japanese workers paid for their frantic work rate with an epidemic of karoshi, i.e. death from heart disease or stroke caused by overwork (Greenspan, 2000). According to Shigemi *et al.* (2000) the proportion of workers in Japan who had great anxiety or perceived their job as difficult or stressful has increased from 51% in 1982; 57% in 1992 and 63% in 1997. The workplace today is therefore widely thought to be more emotionally and mentally stressful than the typical workplace hitherto. A deadly companion to karoshi, also caused by overwork, has recently been recognized in Japan – karojisatsu, work-related depression leading to suicide. Both private and public sector cases have been formally recognized (Greenspan, 2000). Japanese work longer hours than most other industrial nations: 2,044 hours in 1990 compared with 1,646 in France and generally much longer because of unpaid service overtime. Karoshi victims are believed to have logged more than 3,000 hours per year (Mahar, 2000). In Malaysia, it has no figures to assess the loss due to job stress but the number of work-related diseases is increasing; however, the Ministry of Health Malaysia still believes that these is seriously under reporting (Ministry of Health Malaysia, 1996).

Kenny *et al.* (2000) suggested that occupational stress research should have focused on either enhancement of the individual's coping capacity or broader organizational level changes such as increased worker participation in decision making, job enlargement and enrichment, redesign of jobs and working environment, and creation of a more supportive work environment through a range of human resource management interventions in order to prevent stress.

1.1: Definition of Job Stress

Taber's Cyclopedia Medical Dictionary defines stress as "the result produced when a structure, system or organism is acted upon by forces that disrupt equilibrium or produce strain" (Kenny *et al.*, 2000). In simpler terms, stress is the result of any emotional, physical, social, economic, or other factors that require a response or change. It is generally believed that some stress is okay (sometimes referred to as "challenge" or "positive stress") but when stress levels overwhelm the coping ability, both mental and physical changes may occur (Canadian Centre for Occupational Health and Safety, 1999). The same word, "stress" is used to describe both the event and circumstance that cause discomfort and the physical and emotional uneasiness as a result of that situation (Backer *et al.*, 2000).

Job stress, then, is the harmful physical and emotional responses that can happen when there is a conflict between job demands on the employee and the amount of control an employee has over meeting these demands. In general, the combination of high demands in a job and a low amount of control over the situation can lead to job stress (Canadian Centre for Occupational Health and Safety, 1999). Job stress also can be defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker (NIOSH, 1999).

Actually stress is the body's natural reaction when there is an imbalance between the demands of the environment and the ability of the worker to respond to those demands. If the stressful event is of short duration, as soon as the challenge has been met, the body automatically relaxes and the blood pressure, heart rate and other physical functions all return to their normal, pre-stressed state. However, stress increases when the worker has little control over the work and a little stress is not bad, but constant stress over a long period can cause or exacerbate the symptoms of a wide range of disorders (Shigemi *et al.*, 2000). The National Institute of Occupational Safety and Health (NIOSH) in 1999 reported that psychological disorders which result from stress were among the ten leading causes of work-related disease (Canadian Centre for Occupational Health and Safety, 1999). The U.S. Office of Technology Assessment predicts that stress-related illness may be the greatest public health problem faced by workers of the future (Canadian Centre for Occupational Health and Safety, 1999).

No job is free from stress and all work brings responsibilities, problems, demands and pressures. In normal circumstances, it is an unavoidable part of working life and workers are paid to work and a reasonable amount of pressure must be expected. However, not all pressure is negative and the workers are often kept motivated by the challenges and difficulties (NIOSH, 1999). Common complaints from workers are too much responsibility and too little authority, unfair labor practices, and inadequate job descriptions. Every employee should have a specific, written job description and a clear job description, and the employee's expectations are spelled out. Employees can counteract these pressures through workers' unions or other organizations, grievance or personnel offices or, more commonly, by direct negotiations with their immediate supervisors (Shigemi *et al.*, 2000).

The concept of job stress is often confused with challenge, but these concepts are not the same. Challenge energizes the workers psychologically and physically, and it motivates them to learn new skills and master their jobs. When a challenge is met, they feel relaxed and satisfied. Thus, challenge is an important ingredient for healthy and productive

work. But, when the situation is different-the challenge has turned into job demands that cannot be met, relaxation has turned to exhaustion, and a sense of satisfaction has turned into feelings of stress, then it will result in job stress. Nearly everyone agrees that job stress results from the interaction of the worker and the conditions of work (NIOSH, 1999).

Job stress is getting worse rather than better. In 1985, the National Center for Health Statistics released the National Health Interview Survey results (Greenberg, 1999). Back then, only 25 percent of workers felt highly stressed, whereas the 1991 North-western Life study found 46 percent were highly stressed. In 1985, only 13 percent of workers reported having multiple stress-related illnesses. In 1991, 25 percent reported such illnesses (Greenberg, 1999).

1.2: Stressor Variables of Job Stress

Kalimo *et al.* (1987) quoted a study by Cooper and Davidson in 1980 in which the sources of job stress 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, for example, personnel in hospitals, it is essential to be aware of the importance of extra-organizational sources of stress that can affect the performance and mental and physical health of an individual at work. Several sources of job stress exist, some of these stressors are intrinsic to the job, and some are related to other factors as shown in Figure 1 (Greenberg, 1999).

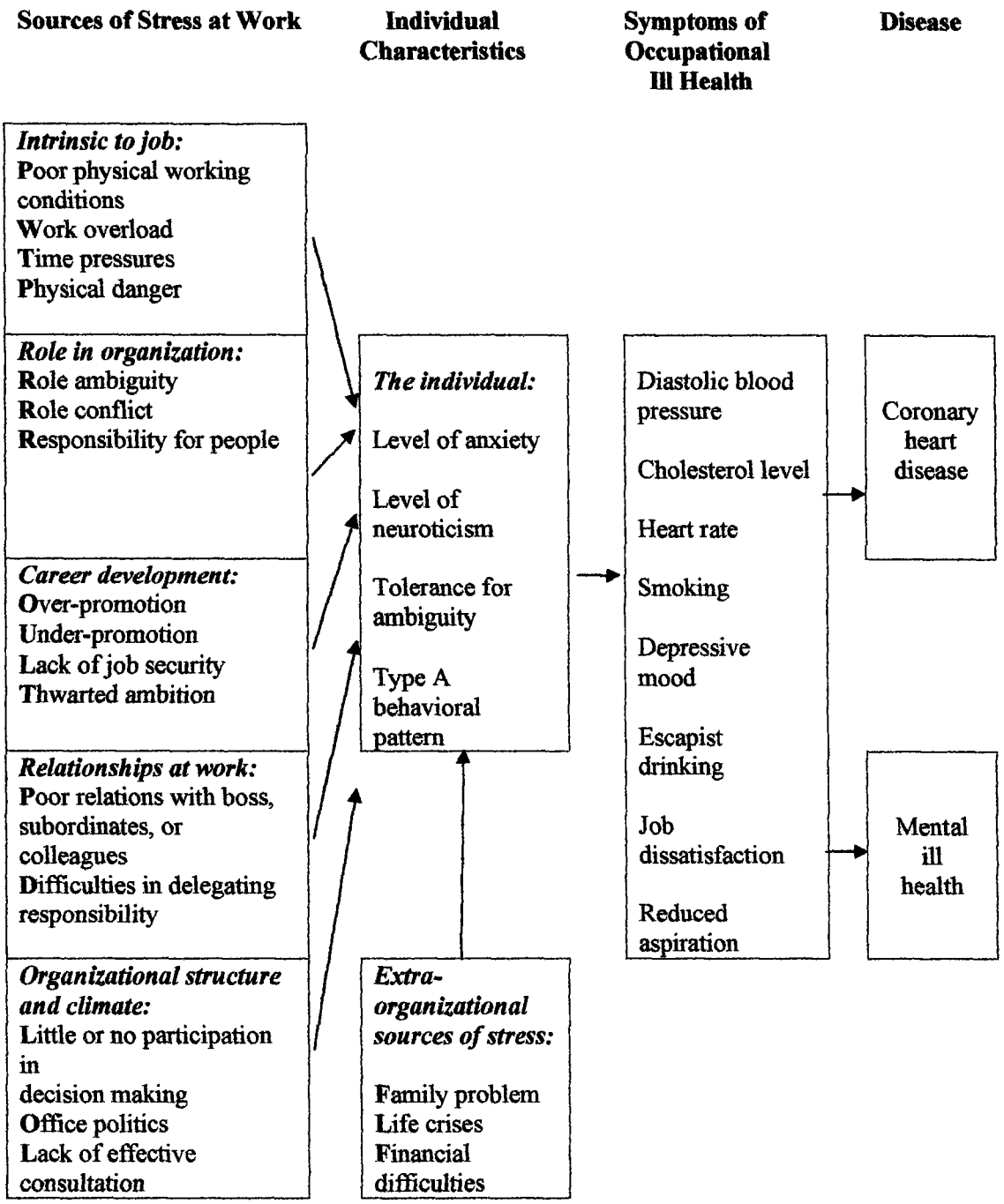

Figure 1: Stressor Variables of Job Stress [Greenberg JS (1999). Occupational Stress. *In* Comprehensive Stress Management. Friedman M, pp. 253-283.]

This model of job stress is simplified by limiting the examples of stress at work, individual characteristics, and extra-organizational sources of stress. Many others could be included. In actuality, different workplaces have different levels of intrinsic job stressors and career development stressors (Greenberg, 1999).

1.2.1: Organizational Stressors

The following five major sources of job stress will be discussed: (a) factors intrinsic to the job; (b) role in the organization; (c) career development; (d) relationships at work; and (e) organizational structure and climate.

(a) Factors Intrinsic to The Job

In a variety of occupations, sources of stress intrinsic to the job include poor physical working conditions such as ergonomic conditions, shift work, work over-load, work under-load (together with a repetitive, routine or under-stimulating working environment), and physical danger (Kalimo *et al.*, 1987). Exposure to other physical stressors, such as toxic exposure or hazardous conditions may lead to illness through entirely different etiological pathways than our "structural stress" model and thus should be measured (Karasek *et al.*, 1983).

(b) Role in The Organization

It has been determined that a person's role at work is a main source of job stress. After a review of the relevant literature, it was concluded that the correlations between role conflict and ambiguity and the components of job satisfaction tend to be strong; between role conflict and ambiguity and mental disorder, however, they tend to be weak (Kalimo *et al.*, 1987). Personality is an important determinant of how an individual reacts to role conflict; greater job-related tension is produced in introverts than in extroverts and it is held that flexible people show greater job-related tension under conditions of conflict than do rigid individuals (Greenberg, 1999).

(c) Career Development

According to Cooper in 1983, environmental stressors were related to career development, i.e. from "the impact of over-promotion, under-promotion, status incongruence, lack of job security, thwarted ambition, etc". Many transitions in working life are recognized as stressful situations. Promotion to a position beyond one's abilities has the potential for inducing behavioral disorders (LaDou, 1997).

(d) Relationship at Work

Relationships at work, their nature, and the social support received from colleagues, supervisors, and subordinates, are related to job stress. Poor relations with other members of an organization may be precipitated by role ambiguity, which produces psychological strain in the form of low job satisfaction (Kalimo *et al.*, 1987). Conflict with a supervisor or coworker is a powerful stressor (LaDou, 1997); moderation of these stress effects can be dependent on social support from coworkers and supervisors (Karasek *et al.*, 1983).

(e) Organizational Structure and Atmosphere

Occupational stress in relation to organizational structure and atmosphere results from such factors as office politics, lack of effective consultation, exclusion from decision-making process, and restrictions on behavior (Greenberg, 1999). It was found that greater participation led to higher productivity, improved performance, lower staff turnover, and lower levels of physical and mental disorder (Kalimo *et al.*, 1987).

1.2.2: Extra-organizational Stressors

Both personality traits and stressors from outside the workplace can influence the likelihood of work-induced stress. Any comprehensive model of stress must help to explain why workers exposed to the same stressors will exhibit different responses (LaDou, 1997). Added to this brew are the extra-organizational sources of stress that come from outside the workplace and outside the worker – family problems, life crises, financial matters, and environmental factors. Mix it all up and out come symptoms of occupational health problems that may develop into full-blown disease (Greenberg, 1999).

1.3: Karasek's Job Strain Model

Robert Karasek originally developed and provided evidence of the "job strain" concept and model and over the last 15 years, this model has highlighted two key elements of these stressors (job demand and job decision latitude), and has been supported by a growing body of evidence (Schnall, 1998). Karasek, writing in 1979, argues that work stress and the resulting physical and mental health effects of work stress, result "not from a single aspect of the work environment, but from the joint effects of the demands of a work situation and the range of decision-making freedom (discretion) available to the worker facing those demands (Schnall *et al.*, 1994). Through its simplicity and applicability, this

model has gained "substantial face value" in the theory and practice of occupational health psychology and epidemiology (De Lange *et al.*, 2000).

Time constraints and job autonomy are two major dimensions of work content. Workers are confronted with two types of time constraints. The first time constraint is formed by time limits such as deadlines. The second time constraint is formed by the speed at which workers need to perform their tasks. Autonomy refers to the possibility a worker has to control - either the method of work or the order in the way a job has to be executed. These two dimensions play a major role in controlling psychosocial stress at work. The model in which time constraints and job autonomy are joined is commonly known as the job strain model and this model reflects to a high degree the working environment of workers (Steven, 1997).

Individual control of the work demands has been observed to be an important factor in producing occupational stress. Karasek has produced a graphical representation of a model indicating his theory as an interaction between job demands and job decision latitude (Schnall *et al.*, 1994). Figure 2 summarizes the four types of jobs that might result from the different combinations of job demands and job decision latitude (job control).

This model seems to capture some important stressful job circumstances: the low control, high demand tasks, particularly in combination with low social support (Steven, 1997). The vertical dimension of decision latitude (increasing towards the top) and the horizontal dimension of psychological job demands (increasing to the right) create four quadrants and the model describes four types of work, namely high strain jobs, low strain jobs, active work and passive work (De Lange *et al.*, 2000).

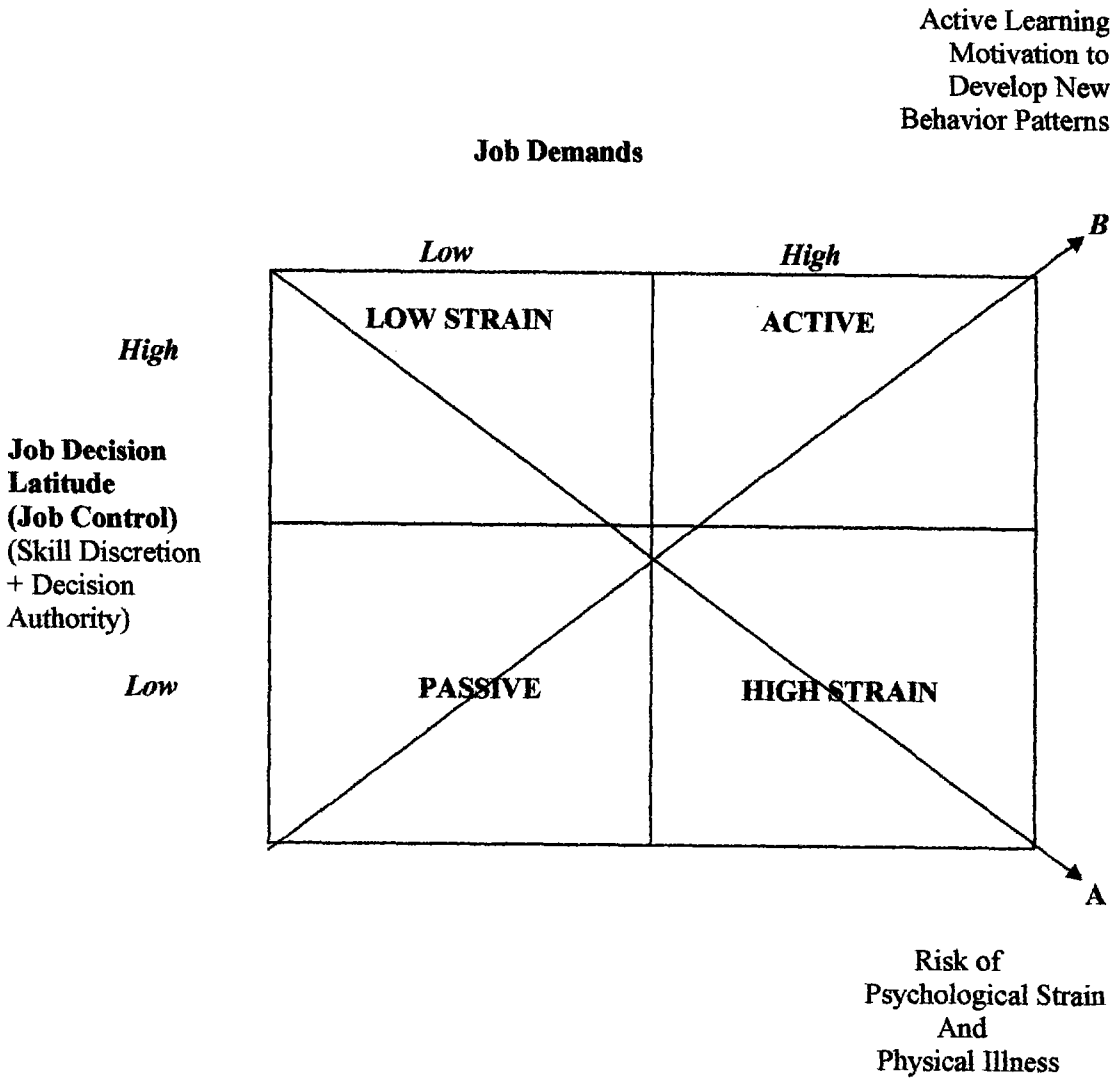

Figure 2: Karasek's Job Strain Model [Schnall PL, Landsbergis PA, Baker D (1994). Job Strain and Cardiovascular Disease. Annual Review of Public Health; **15**: 381-411.]

In the **High-strain** situation (lower right quadrant), the jobs are characterized by high psychological demands and low decision latitude. High demands produce a state of arousal in a worker that would normally be reflected in such responses as elevated heart rate or adrenaline secretion. When workers are constrained by low control, the arousal cannot be appropriately channeled into a coping response, resulting in an even greater physiological reaction, which persists for a longer time. This results in fatigue, anxiety, depression, and physical illness. Karasek and Theorell (1996) hypothesize that employees working in high strain jobs will have an increased risk of developing high blood pressure and reduced job satisfaction or health over time. **Active** jobs (upper right quadrant) are characterized by high psychological demands and high decision latitude. According to Karasek and Theorell (1996), these jobs result in an average amount of health complaints, but more learning opportunities and motivation over time. These intensely demanding jobs encompass activities over which workers feel they have a large measure of control and the freedom to use all available skills. Energy is translated into action through effective problem solving, resulting in little residual psychological strain and these jobs are considered to be motivating and growth producing. The remaining job strain categories are neither stressful nor growth producing. **Low-strain** jobs (upper left quadrant) are characterized by low psychological demands and high decision latitude. These types of jobs are rare and allow the individual to respond to each challenge optimally. In contrast with high strain jobs, people working in low strain jobs will experience lower than average health complaints over time. **Passive** jobs (lower left quadrant) are characterized by low psychological demands and low decision latitude. Over time, employees lose their ability to make judgments, solve problems, or face challenges resulting in a gradual atrophying of learned skills and abilities (Karasek, 1979; Karasek & Theorell, 1996).

The job strain model has two components – increasing risk of heart disease following arrow A, but increasing activity, participation, self esteem, motivation to learn, and sense of accomplishment following arrow B. Thus, this model provides a justification and a public health foundation for efforts to achieve greater worker autonomy as well as increased workplace democracy. Karasek's "job strain" model states that the greatest risk to physical and mental health from stress occurs to workers facing high psychological workload demands or pressures combined with low control or decision latitude in meeting those demands (Schnall, 1998). This model also states that the combination of high demands and low job decision latitude (high strain jobs) will lead to negative physical

health outcomes such as hypertension and cardiovascular disease (CVD) (Schnall *et al.*, 1994).

The use of this model, - by locating the category of workers under consideration in the quadrant, - can facilitate understanding of factors involved in the generation of stress and identification of the most appropriate measures to combat stress (De Lange *et al.*, 2000). The basic concept of this model is that stress results from an imbalance between demand on the worker and the worker's ability to modify those demands. It focused on the adaptive response of individuals to a potentially stressful stimulus, and when the workers could not modify the response or alter the circumstances, it may result in stress (Karasek *et al.*, 1983).

The literature on occupational stress has been dominated by two perspectives, the person-environment (P-E) fit model and Karasek's job demands-control or "job strain" model (Schnall *et al.*, 1994). While there are a variety of models of job stress, the "job strain" model emphasizes the interaction between demands and control in causing stress, and objective constraint on action in the work environment, rather than individual perceptions or "person-environment fit" (Schnall, 1998). While the P-E fit model "focuses on the interaction between the individual and the environment", the job strain model focuses on objective features of the work environment that can trigger disease (Schnall *et al.*, 1994). In 1985, Baker evaluated the evidence for these two models and concluded that the job strain model has a greater "predictive power" than does the P-E fit model (Baker, 1985). Karasek's job strain model has been tested in numerous study populations in various countries including Japan (Schnall, 1998). The possible association between job strain and health outcomes other than CVD and hypertension; such as depression, also needs further investigation (Schnall *et al.*, 1994).

1.4: Depression

Depression may often be initiated by high levels of long-term job stress, it's relationship to failure associated with stress-related under-performance, and life crises. Work-related depression is a clinical illness and the workers should take this seriously (National Institute of Mental Health, 2001). Trends in occupational health psychology also suggest that stress and depression are increasing (Dunnagan *et al.*, 2001). Revicki *et al.* (1993) found a relationship between job stress and depression among workers that can directly influence worker satisfaction.

Goetzel *et al.* (1998) showed that depressed and stressed individuals had 70% and 46% higher health expenditures, respectively, than their healthier counterparts in a study that examined over 46,000 employees over a 3-year period. Therefore, in an organizational climate that promotes the development of emotions such as anger and depression, the results can be devastating for the health of the company and the individual workers who experience the negative effect. Kessler *et al.* (1999) found that depressed workers have between 1.5 and 3.2 more short-term disability days than other workers, with a salary equivalent to productivity loss averaging between $182 and $395.

Organizations rely on a workforce that can be innovative, creative, and committed to the tasks they are responsible to complete. These creative and innovative contributions can be stymied if the individual's mind is clouded with maladaptive stress, anger, and depression. These emotions can deter the worker from making the contributions necessary to help the organization succeed or provide its services (Wah, 2000).

Fava *et al.* (1996), in their clinical assessment of a possible relationship between coronary artery disease risk factors and anger, and anxiety, found that depressed patients with anger attacks had higher cholesterol levels than those without anger attacks. The findings lend support to a hypothesis that workers who suffer from stress and depression due to workplace climate, culture, or both, and who are prone to anger, may be at a higher risk of heart disease than their less depressed and angered counterparts. These findings are applicable to management and workplace health professionals alike, because the negative consequences of worker's depression, anger, and stress have significant implications for organizational and employee health outcomes.

1.5: Justification of Study

The purpose of this study is to determine the prevalence of job strain and depression and their risk factors in the work life of laboratory technicians using Karasek's Job Content Questionnaire (JCQ). To date, there is no available data on job stress among laboratory technicians in Malaysia.

Laboratory technicians play a role in the detection, diagnosis and treatment of disease. Clinical laboratory personnels examine and analyze body fluids, tissues and cells. They look for bacteria, parasites, and other microorganisms; analyze the chemical content of fluids; match blood for transfusions, and measure drug levels in blood to monitor patient's response to treatment (Bureau of Labor Statistics, 1995).

A number of specific stressful working conditions, such as repetitive work, involuntary overtime, inflexible hours, deskilled work and shift-work are related to job stress in laboratory technicians (LaDou, 1997). Shift-work is important in laboratory services because the technical processes cannot be interrupted without affecting the product, and expensive equipment is used more profitably when in constant operation (Canadian Centre for Occupational Health and Safety, 1999).

When studying stressful situations at work, investigators concentrated on either young people who have just started working, or those at the other extreme of the age spectrum – near or after retirement; because there have been reports of the influences of age on responses to stress (Kalimo *et al.*, 1987). Numerous investigations performed in the Federal Republic of Germany of occupational stress among young and older workers have shown that 10% of young workers considered themselves overloaded and under strain, while 19% of the workers over 50 years complained similarly (Kalimo *et al.*, 1987).

We have identified the reasons why this study must be conducted in order to get all the above information, and the following is the list of the significance of the study.
The significance of this study are as follows:

1. The prevalence of job strain and depression in laboratory technicians in Hospital Universiti Sains Malaysia (HUSM) and Hospital Kementerian Kesihatan Malaysia (KKM) can be determined.
2. Risk factors of job strain and depression in laboratory technicians may be modified to improve working conditions in future.
3. The consequence of job strain such as psychological strain (depression) can be determined.

1.6: Conceptual Framework

Figure 3 shows the conceptual framework of this study and as follows:

(1) Job Strain Factors

There are five main factors that have been identified to influence job strain: decision latitude, psychological demands and mental workload, social support, physical demands, and job insecurity.

(a) Decision Latitude

(i) Skill Discretion

(Keep learning new things; can develop skills; require high level of skill; job has variety; and repetitious job).

(ii) Decision Authority

(Have freedom to make own decision; can choose how to perform works; and have a lot of say on the job).

(b) Psychological Demands and Mental Workload

(No excessive work; no conflicting demands; have time to do work; work fast; work hard; and intense concentration).

(c) Social Support

(i) Supervisor Support

(Supervisor shows concern; pay attention; helpful getting work done; and creates good teamwork).

(ii) Coworker Support

(Coworker friendly and helpful; personally interested; and competent).

(d) Physical Demands

(Much physical effort; lift heavy loads; rapid physical activity; awkward body position; and awkward arm position).

(e) Job Insecurity

(Steady job; and good job security).

(2) Satisfaction Motivation

A person normally copes with transitional periods of stress at work by either altering the situation or controlling his response. Many periods of stress, therefore, pass without noticeable reaction. Problems arise when working conditions are in opposition to human needs and resources over a long period of time, with failure to cope. Researchers generally maintain that dissatisfaction job contributes to stress. The mechanism for this relationship comes from the work-stress literature, as described in the stress-control model, and industrial psychology, which has linked thwarted growth needs with job satisfaction and stress outcomes. In addition, stress and dissatisfaction at work become the catalysts for negative health outcomes (Peterson and Dunnagan, 1998).

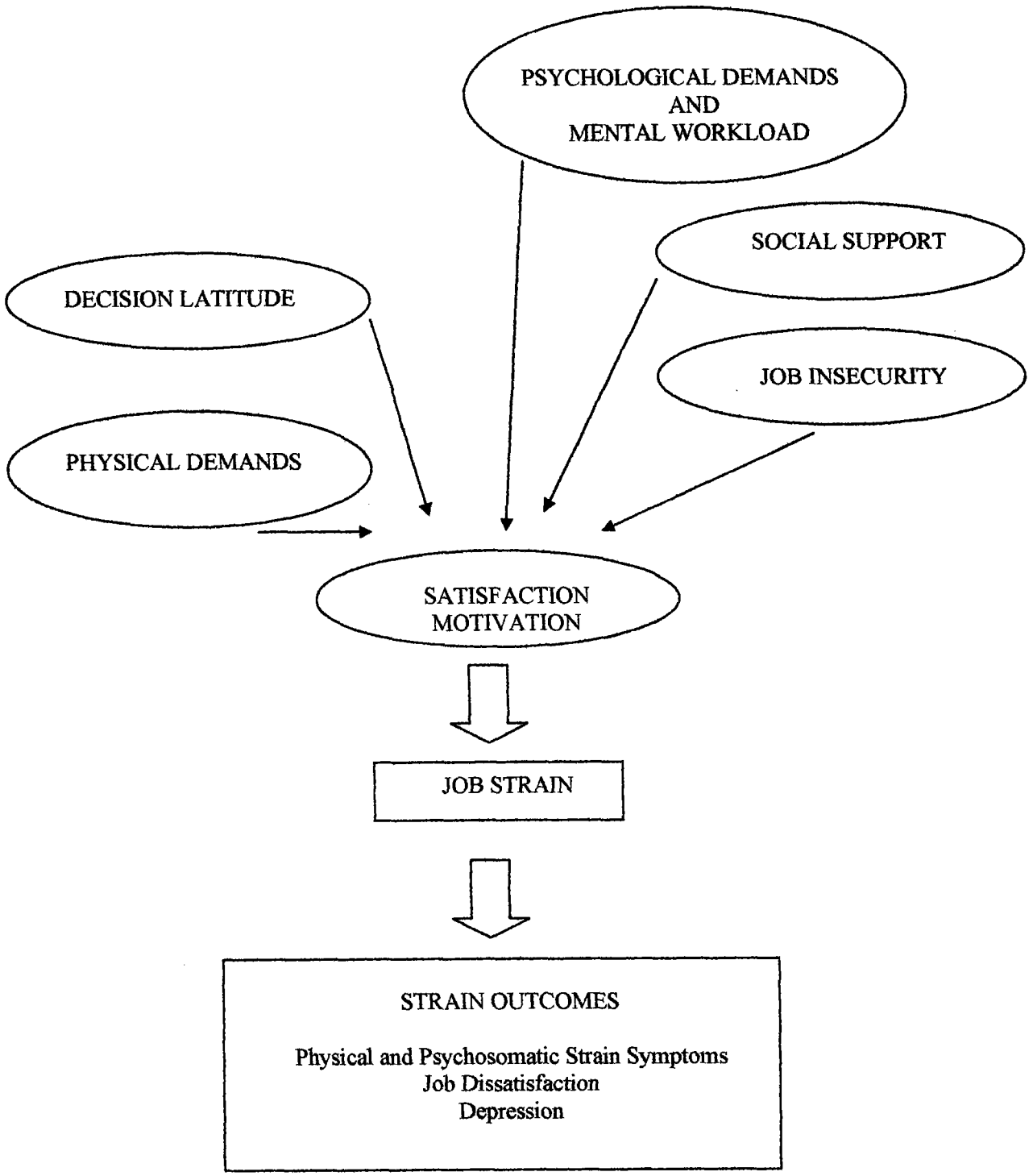

Figure 3: Conceptual Framework of Factors Contributing to Job Stress and Stress Outcomes

(3) Job Strain

Job strain has been defined by Karasek (1979) as work in jobs with high psychological demands (work pace + conflicting demands) and low decision latitude (control + variety and skill use). The main causes of stress at work are the inadequate demands of a job in relation to the worker's abilities, and frustrated aspirations with regard to valued goals. Psychosocial stressors at work are frequently long standing, continuous, or often repeated and the results can be seen as disturbances in the psychological and behavioral functions.

(4) Strain Outcomes

Stressful experiences at work may manifest in a number of psychological and behavioral reactions, taking different forms, and intensity. Sometimes there are no outward manifestations but those in distress suffer internally. At other times, clearly observable, even dramatic, emotional and behavioral expressions of distress become apparent.

The stress effects included physical and psychosomatic strain, general dissatisfaction with life, loss of self-esteem, job dissatisfaction, and depression. There is diversity and complexity of stress-related outcomes and the difficulty of studying the relationships between stressors and the various outcomes, but some of those outcomes, such as psychiatric illness and psychological distress are almost certainly caused and clearly related to stressors (Barnett *et al.*, 1987). In this study, we have to exclude those diagnosed of any psychiatric illness because we want to classify the causal relation between stress and psychiatric illness and not otherwise.

CHAPTER TWO
OBJECTIVES

2.1: General

To study the prevalence and risk factors of job strain and depression in laboratory technicians in Kelantan.

2.2: Specific

1. To compare the prevalence of job strain in laboratory technicians in HUSM and those in KKM Hospitals.

2. To compare the psychosocial, occupational and demographic factors in "high strain" and "non-high strain" laboratory technicians in HUSM and those in KKM Hospitals.

3. To determine the risk factors of job strain in laboratory technicians in HUSM and those in KKM Hospitals.

4. To compare the prevalence of depression in laboratory technicians in HUSM and those in KKM Hospitals.

5. To determine the risk factors of depression in laboratory technicians in HUSM and those in KKM Hospitals.

2.3: Research Hypotheses

1. There is no difference in the prevalence of job strain in laboratory technicians in HUSM compared to those in KKM Hospitals.

2. There is no difference in the psychosocial, occupational and demographic factors in "high strain" and "non-high strain" laboratory technicians in HUSM and those in KKM Hospitals.

3. There is no difference in the risk factors of job strain in laboratory technicians in HUSM compared to those in KKM Hospitals.

4. There is no difference in the prevalence of depression in laboratory technicians in HUSM compared to those in KKM Hospitals.

5. There is no difference in the risk factors of depression in laboratory technicians in HUSM compared to those in KKM Hospitals.

CHAPTER THREE
METHODOLOGY

3.1: Research Design

This is a cross-sectional comparative study designed to investigate the factors in the job that contribute to job stress and their consequences to health. Various categories of laboratory technicians from HUSM and KKM Hospitals were chosen. The similar job type was taken because we want to compare the stress levels in laboratory technicians in two different organizations with different places of work.

3.2: Sample Size

Sample size calculation was based on the guideline by Professor Robert Karasek in his article on "Job Content Questionnaire and User's Guide" (Karasek, 1997). The formula was used to give the exact relationship between statistical power, sample size, and confidence interval. A sample size of 50 should allow detection of a scale score difference of 0.50 standard deviations and 0.75 standard deviation differences could be detected with a smaller sample. However, to confirm a 0.25 standard deviation difference will require a substantially larger sample than 50. Table 1 shows the 'typical' sample size that we need; at a given scale difference, and at a given level of statistical significance and the calculations are based on a two-tailed test for significance.

3.3: Sampling Method

We developed specific inclusion and exclusion criteria to select our study subjects and only those matching the criteria will be recruited. The inclusion criteria include laboratory technicians (a) aged between 18 to 55 years and (b) holding grade U8 posts. Grade U8 is the skill of the grade that been use by Kementerian Kesihatan Malaysia (KKM) in allocating the laboratory technicians when they firstly joined this type of job. We chose grade U8 because the majority of laboratory technicians are categorized under this grade and the responses to stress are different between the grades. Furthermore, the number of laboratory technicians in other grades is very small. The exclusion criteria include a diagnosis of any psychiatric illness. These inclusion and exclusion criteria were used for both laboratory technicians in HUSM and KKM Hospitals. A sampling frame was constructed from databases for laboratory technicians available from Personnel Office in HUSM and also from each KKM Hospital. We have chosen seven KKM Hospitals in Kelantan: Hospital Kota Bharu, Hospital Pasir Mas, Hospital Pasir Puteh, Hospital

Tumpat, Hospital Tanah Merah, Hospital Machang, and Hospital Kuala Krai. The subjects were briefed about the study and their written consents were obtained.

Table 1.User sample size ("n" You) and given national sample group size ("n" Nat)

p values	Difference in Means					
	0.75 std. dev.		0.50 std. dev.		0.25 std. dev.	
	"n" Nat	"n" You	"n" Nat	"n" You	"n" Nat	"n" You
< 0.10	6	9	6	not pos	6	not pos
	11	5	11	25	11	not pos
	20	5	20	12	20	not pos
	40	4	40	9	40	95
	80	4	80	8	80	44
	160	4	160	8	160	35
< 0.05	6	40	6	not pos	6	not pos
	11	9	11	> 1000	11	not pos
	20	7	20	20	20	not pos
	40	6	40	14	40	> 1000
	80	6	80	12	80	80
	160	5	160	11	160	53
< 0.01	6	not pos	6	not pos	6	not pos
	11	33	11	not pos	11	not pos
	20	13	20	120	20	not pos
	40	10	40	30	40	not pos
	80	9	80	22	80	500
	160	8	160	19	160	121

Notes:

std. dev. = standard deviations
"n" Nat = The population size
"n" You = The actual sample size that should be take by the investigators
Not pos = Not possible for the sample size calculation
* The number in the circle is the number of sample size which we used as a guideline in this study

3.4: Research Protocol

Research proposal was approved by Department of Community Medicine in October 2000 and the selection of research instrument was commenced. The research instrument was Karasek's Job Content Questionnaire. The Research and Ethical Committee, School of Medical Sciences, USM, Kelantan Health Campus approved this study on 11th August 2001. We went to see all heads of departments in charge of the laboratories in HUSM and the respective laboratory technicians for their consents and registrations. We did similarly for KKM Hospitals. Data collection was done via self-administered questionnaire at the workplace and the subjects were

allowed by their supervisors to fill in the questionnaire during regular working hours. Figure 4 illustrates the flow of the study.

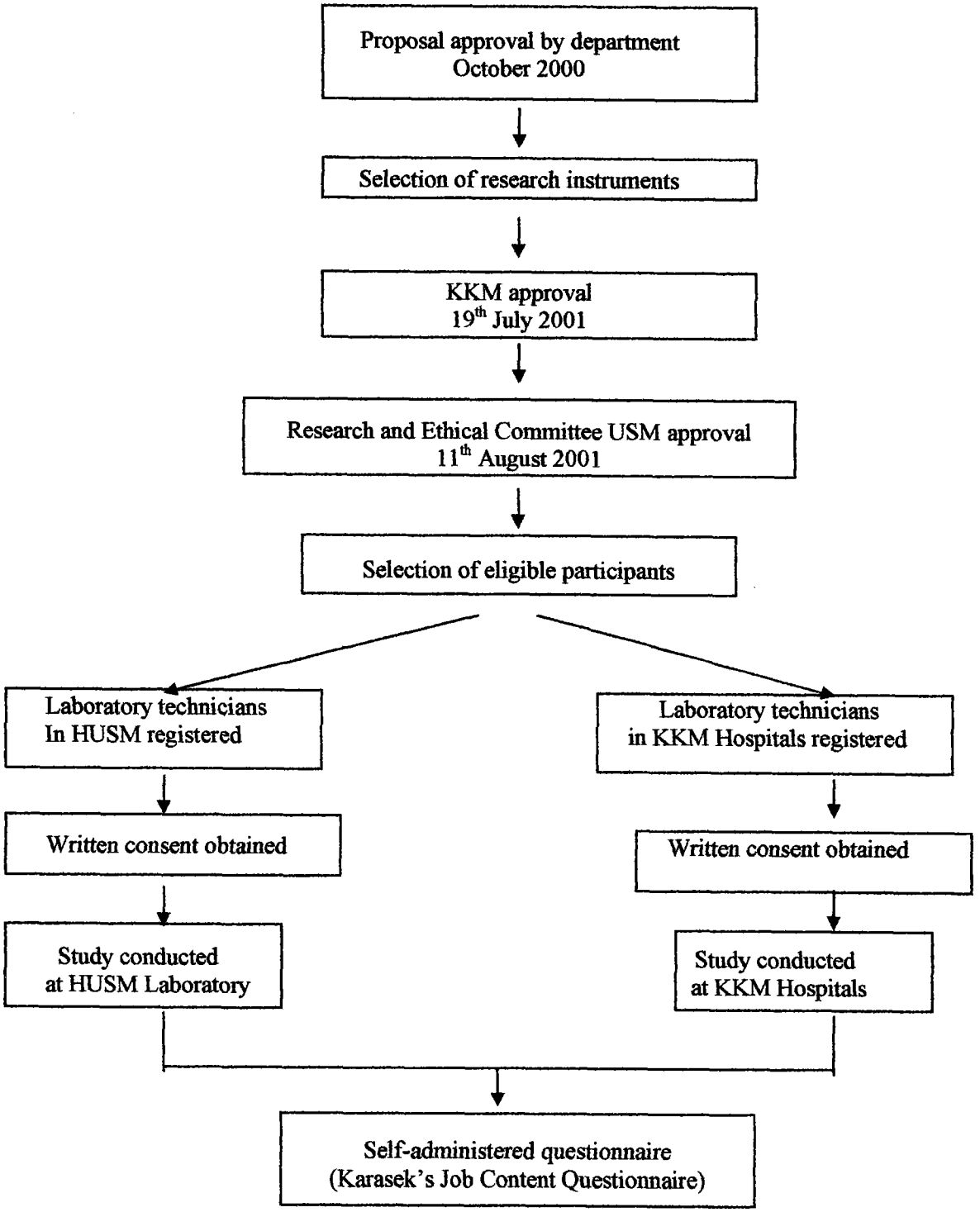

Figure 4. Flow Chart of the Study

3.5: Research Instruments

3.5.1: Job Content Questionnaire (JCQ)

JCQ is a questionnaire based instrument designed to measure the content of a work tasks. The job strain measure is derived from the JCQ 1.7 (Revised 1997) including added scale and extensions of original scales for Framingham version (Karasek *et al.*, 1998). This is a 42-item questionnaire developed by Robert Karasek, based, in part, on questions drawn from the US Department of Labor/University of Michigan Quality of Employment Surveys. Job content questionnaire contains of five scales. Two scales are used to define job strain – decision latitude and psychological demands.

The first scale, decision latitude, is defined as the sum of two subscale: 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 demands, defined by five items (excessive work, conflicting demands, insufficient time to work, work fast, and work hard). All questions are scored on a Likert scale of 1 to 4 (strongly disagree, disagree, agree, and strongly agree), and psychological demands ranges from 12 to 48 while decision latitude ranges from 24 to 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 is 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 concerned, supervisor pays attention, supervisor is helpful, and supervisor is a good organizer). 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 single item only (much physical effort) and the last scale is job insecurity, measured by three items (steady work, job security, and future layoff).

There are also questions measuring psychological strain and job dissatisfaction (26 questions total: section II - #V1–V5, measuring job dissatisfaction, and section II - #R1-R8,

measuring depression). To control for physical hazards at work that may also contribute to the outcome variables, JCQ recommend the 9 question physical hazard and exposure scales (#39-47). The conceptual framework underlying the JCQ allows its application in social policy as a measure of work quality, in addition to the more commonly assessed work quantity issues: wages, hours, and benefits (section IV) and the questions in section III are about technology. No personality orientation scales or measures of non-job stressors are included – two areas in which we think are not so important at the moment to be measured because we want to concentrate only on job stressors.

3.5.2: List of Job Content Questionnaire Questions – Recommended Format

* Questions excluded in shorter the "Framingham Version" of the JCQ (27 questions)

JCQ questions added (to the QES) at the time of the development of the original JCQ (version 1.1) in 1985

D.L = Decision Latitude = Skill Discretion + Decision Authority

S.D = Skill Discretion (Q3, 4, 5, 7, 9, 11)

- Q3 "learn new things"
- Q4 "repetitive work"
- Q5 "requires creative"
- Q7 "high skill level"
- Q9 "variety"
- Q11 "develop own abilities"

D.A = Decision Authority (Q6, 8, 10)

- Q6 "allows own decisions"
- Q8 "little decision freedom"
- Q10 "lot of say"

Ps. D = Psychological Job Demands (Q19, 20, 22, 23, 26, 27, 28, 29, 32)

- Q19 "work fast"
- Q20 "work hard"
- Q22 "no excessive work"
- Q23 "enough time"
- Q26 "conflicting demands"
- Q27 "intense concentration"#
- Q28 "tasks interrupted"#

Q29 "hectic job"#

Q32 "wait on others"#

Ph. D = Physical Job Demands (Q21, 24, 25, 30, 31)

Q21 "much physical effort"

Q24 "lift heavy loads"#

Q25 "rapid physical activity"#

Q30 "awkward body position"#

Q31 "awkward arm position"#

J.I = Job Insecurity (Q33, 34, 35, 36, 37, 38)

Q33 "steady work"

Q34 "job security"

Q35 "recent layoff"#

Q36 "future layoff"

*Q37 "career possibilities"#

*Q38 "my skills valuable"#

*S.S = Supervisor Social Support (Q48, 49, 50, 51, 52)

*Q48 "supervisor is concerned"

*Q49 "supervisor pays attention"

*Q50 "hostile supervisor"#

*Q51 "helpful supervisor"

*Q52 "supervisor good organizer"

*C.S = Coworker Social Support (Q53, 54, 55, 56, 57, 58)

*Q53 "coworkers competent"

*Q54 "coworker interest in me"

*Q55 "hostile coworkers"#

*Q56 "friendly coworkers"

*Q57 "coworkers work together"#

*Q58 "coworkers helpful"

3.5.3: Internal Validity of JCQ

We have translated the Job Content Questionnaire (JCQ) into Malay version. Pre-testing for reliability was done among school teachers using the similar questionnaire (Harmy, 2001). He found that the questionnaire was comprehensible to an average educated person, such as a teacher, and he postulated that other job categories would have similar understanding.

3.6: Statistical Analysis

Data entry and analysis was done using Statistical Program for Social Science (SPSS) Version 10.0 (Norusis, 1999). Means ± standard deviation (SD) for continuous variables and frequency and percentages for categorical variables were calculated for socio-demographic characteristics and occupational characteristics. Independent t-test was used to compare the mean difference for continuous and chi square for categorical data with level of statistical significant was set at 0.05.

Prevalence of job strain was defined in laboratory technicians in HUSM and KKM Hospitals by using median as a cut of point for psychological job demands and decision latitude (Karasek, 1979). Those above the median were considered high and below the median as low in both psychological job demands and decision latitude. According to Karasek Job Strain Model, 'high strain' were characterized by high psychological job demands and low decision latitude, 'active' were characterized by high psychological job demands and high decision latitude, 'passive' were characterized by low psychological job demands and low decision latitude and 'low strain' were characterized 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 statistically significant was 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 for both HUSM and KKM Hospitals.

Chi-square test was used for prevalence of depression between laboratory technicians in HUSM and KKM Hospitals. The level of significance was set at p value less than 0.05.

The association between the psychosocial job factors (dimensions from the demand-control model) and depression were determined using multiple logistic regression analysis adjusted for possible confounding etiologic factors, such as age, sex, ethnic group, marital status, educational level, and income per month, as suggested by Karasek and Theorell in 1996. Depression was treated as dichotomous binary outcomes, those above the median were considered depressed and below the median as non-depressed. Crude odds ratio for variables in

the model were drawn from simple logistic regression. Adjusted odds ratio was estimated with 95% confidence intervals. Logistic regression models in a backward elimination procedure were used to estimate the degree of association between factors from the psychosocial work environment and the depression. Variables that had p value of 0.2 or less in univariate analysis, biologically plausible and those under main interest of the study were entered into the model in a block and then sequentially removed one at a time. The variable with the largest Wald test statistic p value was considered first for removal. Likelihood-ratio test that compared the log likelihood of full model with reduced model would determine whether the independent variable could be removed or not. If the likelihood-ratio test was not significant, the variable could be removed. The procedure stopped when there were no further variables in the equation that could be removed.

The final model was tested for fitness by using Hosmer-Lemeshow goodness-of-fit test. If the p value approached one, the model was a perfect fit. The main effect of the model was checked for possible 2 ways interactions by using likelihood ratio test. Although the analyses were conducted using SPSS Version 10.0 but STATA 7 (STATA 7, 1984-2001) was used to counter checks the results for simple and multiple logistic regression.

CHAPTER FOUR
RESULTS

4.1: Profile of Respondents

Out of 102 laboratory technicians in HUSM, 84 of them were willing to answer the questionnaire and the response rate was 82.4%. In KKM Hospitals 71 out of 79 were answering the questionnaire and the response rate was 89.9%.

4.2: Socio-demographic Characteristics

Socio-demographic characteristics of 84 laboratory technicians in HUSM and 71 in KKM Hospitals are shown in Table 2. Laboratory technicians in HUSM were generally younger (mean age 31.7 ± 9.0 years) compared to those in KKM Hospitals (mean age 41.7 ± 6.2 years). Laboratory technicians in KKM Hospitals had significantly more children (mean = 2.9 ± 2.3) compared with those in HUSM (mean = 1.5 ± 1.9). There were also significant differences between laboratory technicians in HUSM and KKM Hospitals with respect to ethnic group, marital status and educational level.

Table 2. Socio-demographic Characteristics of 84 Laboratory Technicians in HUSM and 71 in KKM Hospitals

Variables	HUSM		KKM		Difference (p value)[a]
	Mean ± SD	No.(%)	Mean ± SD	No.(%)	
Age (yr)	31.7 ± 9.0		41.7 ± 6.2		< 0.001
No. of children	1.5 ± 1.9		2.9 ± 2.3		< 0.001
Income per month (RM)	1510.9 ± 406.5		1558.4 ± 275.5		NS [b]
Sex					
Male		38(45.2)		37(52.1)	NS
Female		46(54.8)		34(47.9)	
Ethnic group					
Malay		69(82.1)		66(93.0)	< 0.05
Non- Malay [c]		15(17.9)		5(7.0)	
Marital status					
Married		54(64.3)		69(97.2)	< 0.001
Single/divorce		30(35.7)		2(2.8)	

Educational level			
University	82(97.6)	31(43.7)	< 0.001
Non-University[d]	2(2.4)	40(56.3)	
Smoking status			
Yes	12(14.3)	14(19.7)	NS
No	72(85.7)	57(80.3)	

[a] Significance for group difference (Independent *t*-test for age, no. of children, and income per month; χ^2 for all others)
[b] NS: Not Significant, $p > 0.05$
[c] Chinese, Indian and Siamese
[d] Primary School, Lower & Upper Secondary School

4.3: Occupational Characteristics

Table 3 shows the occupational characteristics of 84 laboratory technicians in HUSM and 71 in KKM Hospitals. Laboratory technicians in KKM Hospitals had significantly longer average duration of work per week, duration of employment, and total duration of employment (53.1 hours, 152.8 months, and 18.1 years, respectively) compared with those in HUSM (45.5 hours, 100.1 months, and 9.7 years, respectively). A higher proportion of laboratory technicians in KKM Hospitals were union members (87.3%) and always using computer or automated machines (67.1%) compared with those in HUSM (65.5% and 51.2%, respectively).

Table 3. Occupational Characteristics of 84 Laboratory Technicians in HUSM and 71 in KKM Hospitals

Variables	HUSM		KKM		Difference (p value)[a]
	Mean ± SD	No.(%)	Mean ± SD	No.(%)	
Average duration of work per week (hr)	45.5 ± 14.0		53.1 ± 17.2		< 0.01
Duration of employment (mth)	100.1 ± 91.8		152.8 ± 90.4		< 0.001
Total duration of employment (yr)[b]	9.7 ± 8.8		18.1 ± 6.9		< 0.001
Union member					
Yes		55(65.5)		62(87.3)	< 0.01
No		29(34.5)		9(12.7)	
Shift work					
Yes		11(13.1)		18(25.4)	NS [c]
No		73(86.9)		53(74.6)	
Using computer or automated machines					
Not at all		8(9.5)		1(0.1)	< 0.01
Occasionally		15(17.9)		8(11.4)	
Often		18(21.4)		15(21.4)	
Always		43(51.2)		47(67.1)	

[a] Significance for group difference (Independent *t*-test for average duration of work per week, duration of employment, and total duration of employment; χ^2 for all others)

[b] Including previous job

[c] NS: Not Significant, $p > 0.05$

4.4: Prevalence of Job Strain

The prevalence of job strain in laboratory technicians in HUSM and KKM Hospitals is shown in Table 4. Majority of laboratory technicians in HUSM and KKM Hospitals were classified under the passive group (36.9% and 29.6%, respectively). A higher proportion (33.3%) of laboratory technicians in HUSM belongs to the high strain group compared with those in KKM Hospitals (26.8%). However, these differences were not statistically significant.

Table 4. Prevalence of Job Strain in 84 Laboratory Technicians in HUSM and 71 in KKM Hospitals

Job Strain Categories	HUSM		KKM		Difference (p value)[a]
	No.	%	No.	%	
Low Strain	15	17.9	17	23.9	NS [b]
Passive	31	36.9	21	29.6	
Active	10	11.9	14	19.7	
High Strain	28	33.3	19	26.8	
Total	84	100.0	71	100.0	

[a] Significance for group difference: χ^2 was used to test the difference across the hospitals
[b] NS: Not Significant, $p > 0.05$

4.5: Psychosocial, and Occupational and Demographic Factors of Job Strain

Differences in psychosocial job characteristic, and occupational and demographic factors in 28 "high strain" and 56 "non-high strain" laboratory technicians in HUSM is shown in Table 5.

Controlling for age, sex, marital status, and educational level, the "high strain" group scored significantly higher for toxic exposures, total psychological stressors, and total physical stressors compared to the "non-high strain" group.

Laboratory technicians in "high strain" group had significantly longer average duration of work (hour) (0.5 ± 0.5) compared to those in "non-high strain" group (0.2 ± 0.4).

Table 5. Differences in 10 Psychosocial, and 9 Occupational and Demographic Factors of 28 "High Strain" and 56 "Non-High Strain" Laboratory Technicians in HUSM

Variables	High Strain		Non-High Strain [a]		p value [b]	ANCOVA [c]	
	Mean ± SD	No. (%)	Mean ± SD	No. (%)		F value	p value
Psychosocial Job Factors:							
Job Insecurity	6.2 ± 1.8		5.6 ± 2.3		0.25	2.57	0.08
Coworker Support	12.0 ± 2.2		12.5 ± 1.1		0.21	1.11	0.33
Supervisor Support	12.4 ± 6.0		12.6 ± 4.1		0.83	0.06	0.95
Social Support	24.4 ± 6.9		25.1 ± 4.3		0.55	0.25	0.78
Physical Exertion	2.7 ± 0.6		2.5 ± 0.7		0.26	2.05	0.14
Hazardous Conditions	4.5 ± 2.9		3.9 ± 2.3		0.36	2.08	0.13
Toxic Exposures	3.9 ± 2.0		3.3 ± 1.5		0.12	3.14	0.04
Total Psychological Stressors	42.2 ± 3.8		35.8 ± 4.4		<0.01	19.76	<0.01
Total Physical Hazard	8.4 ± 4.6		7.2 ± 3.6		0.21	2.82	0.07
Total Physical Stressors	11.0 ± 4.7		9.7 ± 3.9		0.18	3.17	0.04
Occupational and Socio-demographic Factors:							
Average duration of work (hr)	0.5 ± 0.5		0.2 ± 0.4		0.02		
Duration of employment (mth)	04 ± 0.5		0.4 ± 0.5		0.97		
Total duration of employment (yr)	0.5 ± 0.5		0.4 ± 0.5		0.50		
Age (years)							
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)	
Educational Level			
Non-University	0(0.0)	2(3.6)	0.55[d]
University	28(100.0)	54(96.4)	
Income Per Month (RM)			
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] Analysis of covariance (ANCOVA): to test the differences in adjusted means of job strain characteristics across the comparison group, controlling for age, sex, marital status, and educational level

[d] Fisher's exact test

Differences in psychosocial job characteristic, and occupational and demographic factors in 19 "high strain" and 52 "non-high strain" laboratory technicians in KKM Hospitals is shown in Table 6.

Controlling for age, sex, marital status, and educational level, the "high strain" group scored significantly higher for hazardous conditions, toxic exposures, total psychological stressors, total physical hazard, and total physical stressors compared to the "non-high strain" group.

Laboratory technicians in "high strain" group had significantly younger in age (18 – 34 years) group (42.1%) compared to those in "non-high strain" group (7.7%).

Table 6. Differences in 10 Psychosocial, and 9 Occupational and Demographic Factors of 19 "High Strain" and 52 "Non-High Strain" Laboratory Technicians in KKM Hospitals

Variables	High Strain		Non-High Strain [a]			ANCOVA [c]	
	Mean ± SD	No. (%)	Mean ± SD	No. (%)	p value [b]	F value	p value
Psychosocial Job Factors:							
Job Insecurity	6.9 ± 2.3		5.2 ± 2.1		<0.01	2.56	0.08
Coworker Support	11.8 ± 1.0		12.6 ± 1.4		0.01	1.73	0.18
Supervisor Support	10.8 ± 2.1		12.0 ± 1.9		0.03	1.83	0.17
Social Support	22.6 ± 2.8		24.6 ± 3.0		0.01	2.28	0.11
Physical Exertion	2.8 ± 0.7		2.8 ± 0.8		0.87	0.12	0.89
Hazardous Conditions	5.3 ± 1.9		3.5 ± 2.3		<0.01	3.78	0.03
Toxic Exposures	4.1 ± 1.3		3.5 ± 1.2		0.04	7.58	<0.01
Total Psychological Stressor	43.1 ± 2.9		36.5 ± 4.0		<0.01	13.93	<0.01
Total Physical Hazard	9.4 ± 2.9		6.9 ± 3.0		<0.01	5.45	<0.01
Total Physical Stressor	12.3 ± 3.0		9.7 ± 3.2		<0.01	4.86	0.01
Occupational and Socio-demographic Factors:							
Average duration of work (hr)	0.7 ± 0.5		0.5 ± 0.5		0.18		
Duration of employment (mth)	0.4 ± 0.5		0.6 ± 0.5		0.12		
Total duration of employment (yr)	0.6 ± 0.5		0.8 ± 0.4		0.24		
Age (years)							
18 – 34		8(42.1)		4(7.7)	<0.01		
35 – 44		5(26.3)		30(57.7)			
45 – 55		6(31.6)		18(34.6)			

Sex			
Female	12(63.2)	22(42.3)	0.20
Male	7(36.8)	30(57.7)	
Ethnic Group			
Non-Malay	2 (10.5)	3(5.8)	0.61
Malay	17(89.5)	49(94.2)	
Marital Status			
Non-Married	2(10.5)	0(0.0)	0.07[d]
Married	17(89.5)	52(100.0)	
Educational Level			
Non-University	9(47.4)	31(59.6)	0.36
University	10(52.6)	21(40.4)	
Income Per Month (RM)			
700 – 1300	3(15.8)	9(17.3)	0.32
1301 – 1700	13(68.4)	26(50.0)	
1701 – 3000	3(15.8)	17(32.7)	

[a, b, c, d,] As per Table 5

4.6: Risk Factors of Job Strain

The risk factors of job strain in 84 laboratory technicians in HUSM is shown in Table 7. 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 (OR 2.4, 95% CI 1.2-5.7), physical exertion (OR 1.7, 95% CI 1.1-2.9), and total psychological stressors (OR 3.6, 95% CI 1.8-7.1).

Table 7. Risk Factors of Job Strain in 84 Laboratory Technicians in HUSM

Risk Factors	Crude Odds Ratio[a]	Adjusted Odds Ratio[b]	95% Confidence Interval	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 test, $\alpha < 0.05$

The final model of risk factors of job strain in laboratory technicians in HUSM using multiple logistic regression was checked for fitness using Hosmer-Lemeshow goodness-of-fit test. The p value was not significant, thus the model was fit. The main effect of the model was also checked for interactions by using 2-ways interactions test and if this was not significant thus there were no significant interactions between each variable in the final model.

The risk factors of job strain in 71 laboratory technicians in KKM Hospitals is shown in Table 8. Controlling for age, sex, ethnic group, marital status, educational level, and income per month, the risk factors of job strain in 71 laboratory technicians in KKM Hospitals were physical exertion (OR 1.2, 95% CI 1.1-4.8), and total psychological stressors (OR 2.5, 95% CI 1.4 - 4.6).

Table 8. Risk Factors of Job Strain in 71 Laboratory Technicians in KKM Hospitals

Risk Factors	Crude Odds Ratio[a]	Adjusted Odds Ratio[b]	95% Confidence Interval	p value[c]
Physical Exertion	1.1	1.2	1.1 – 4.8	0.02
Total Psychological Stressor	1.8	2.5	1.4 – 4.6	<0.01

[a, b, c] As per Table 7

The final model of risk factors of job strain in laboratory technicians in KKM Hospitals using multiple logistic regression was checked for fitness using Hosmer-Lemeshow goodness-of-fit test. The p value was not significant, thus the model was fit. The main effect of the model was also checked for interactions by using 2-ways interactions test and if this was not significant thus there were no significant interactions between each variable in the final model.

4.7: Prevalence of Depression

Table 9 shows the prevalence of depression in 84 laboratory technicians in HUSM and 71 in KKM Hospitals. A higher proportion (59.5%) of laboratory technicians in HUSM experienced depression compared to those in KKM Hospitals (39.4%). The difference is statistically significant ($p < 0.05$).

Table 9. Prevalence of Depression in 84 Laboratory Technicians in HUSM and 71 in KKM Hospitals

Variable	HUSM		KKM		p value[a]
	No.	%	No.	%	
Depression					
Yes	50	59.5	28	39.4	0.016
No	34	40.5	43	60.6	

[a] χ^2– test

4.8: Risk Factors of Depression

Table 10 shows the socio-demographic risk factors of depression in 84 laboratory technicians in HUSM. There were no significant differences in age, sex, ethnic group, marital status, educational level, and income per month.

Table 10. Socio-demographic Risk Factors of Depression in 84 Laboratory Technicians in HUSM

Socio-demographic characteristics	Depressed		Non-Depressed		p value[a]
	No.	%	No.	%	
Age (years)					
18 – 34	30	66.7	15	33.3	0.321
35 – 44	16	53.3	14	46.7	
45 – 55	4	44.4	5	55.6	
Sex					
Female	28	63.6	18	36.4	0.782
Male	22	57.9	16	42.1	
Ethnic group					
Non-Malay	10	66.7	5	33.3	0.534
Malay	40	58.0	29	42.0	
Marital status					
Non-married	19	63.3	11	36.7	0.596
Married	31	57.4	23	42.6	
Educational level					
Non-university	2	100.0	0	0.0	0.147 [b]
University	48	58.5	34	41.5	
Income per month (RM)					
700 – 1300	27	71.1	11	28.9	0.096
1301 – 1700	12	57.1	9	42.9	
1701 – 3000	11	44.0	14	56.0	

[a] χ^2 – test

[b] Fisher's exact test

Table 11 shows psychosocial job risk factors of depression in 84 laboratory technicians in HUSM. There were no significant associations between depressive status and skill discretion, decision authority, psychological demand, social support, hazardous condition, and physical demand.

Table 11. Psychosocial Job Risk Factors of Depression in 84 Laboratory Technicians in HUSM

Psychosocial job factors	Depressed		Non-Depressed		p value[a]
	No.	%	No.	%	
Skill Discretion					
Low	27	58.7	19	41.3	0.865
High	23	60.5	15	39.5	
Decision Authority					
Low	45	60.8	29	39.2	0.517
High	5	50.0	5	50.0	
Psychological Demand					
Low	24	52.2	22	47.8	0.154
High	25	67.6	12	32.4	
Social Support					
Low	19	70.4	8	29.6	0.096
Moderate	16	57.1	12	42.9	
High	13	48.1	14	51.9	
Hazardous Condition					
Low	29	59.2	20	40.8	0.940
High	21	60.0	14	40.0	
Physical Demand					
Low	26	61.9	16	38.1	0.402
High	20	52.6	18	47.4	

[a] χ^2 - test

Table 12 shows the results of multiple logistic regression analysis of risk factors of depression in 84 laboratory technicians in HUSM. The adjusted odds ratio of having depression for high psychological demand was 3.0 times higher than low psychological demand (95% CI 1.0–8.8). The adjusted odds ratio of having depression for low social support was 4.7 times (95% CI 1.2–18.8) and moderate social support was 3.6 times (95% CI 1.0–12.9) higher than high social support.

Table 12. Multiple Logistic Regression Analysis of Risk Factors of Depression in 84 Laboratory Technicians in HUSM

Risk Factors	Crude Odds Ratio[a]	Adjusted Odds Ratio[b]	95% Confidence Interval	p value[c]
Psychological Demand				
Low	1.0	1.0		
High	1.9	3.0	1.0 – 8.8	0.047
Social Support				
High	1.0	1.0		
Moderate	1.4	3.6	1.0 – 12.9	0.050
Low	2.6	4.7	1.2 – 18.8	0.027

[a] Simple logistic regression
[b] Multiple logistic regression: adjusted for age, sex, ethnic group, marital status, educational level, and income per month.
[c] Likelihood-ratio test, $\alpha < 0.05$

The final model of risk factors of depression in laboratory technicians in HUSM using multiple logistic regression was checked for fitness using Hosmer-Lemeshow goodness-of-fit test. The p value was not significant, thus the model was fit. The main effect of the model was also checked for interactions by using 2-ways interactions test and if this was not significant thus there were no significant interactions between each variable in the final model.

Table 13 shows the socio-demographic risk factors of depression in 71 laboratory technicians in KKM Hospitals. There were significant differences in age (p=0.021), sex (p=0.026) and marginally not significant for income per month (p=0.051). However, there were no significant differences in ethnic group, marital status, and educational level.

Table 13. Socio-demographic Risk Factors of Depression in 71 Laboratory Technicians in KKM Hospitals

Socio-demographic characteristics	Depressed		Non-Depressed		p value[a]
	No.	%	No.	%	
Age (years)					
18 – 34	9	75.0	3	25.0	0.021
35 – 44	12	34.3	23	65.7	
45 – 55	7	29.2	17	70.8	
Sex					
Female	18	52.9	16	47.1	0.026
Male	10	27.0	27	73.0	
Ethnic group					
Non-Malay	2	40.0	3	60.0	0.979[b]
Malay	26	39.4	40	60.6	
Marital status					
Non-married	1	50.0	1	50.0	0.759[b]
Married	27	39.1	42	70.9	
Educational level					
Non-university	16	40.0	24	60.0	0.912
University	12	38.7	19	61.3	
Income per month (RM)					
700 – 1300	2	16.7	10	83.3	0.051
1301 – 1700	20	51.3	19	48.7	
1701 – 3000	6	30.0	14	70.0	

[a] χ^2 – test

[b] Fisher's exact test

Table 14 shows psychosocial job risk factors of depression in 71 laboratory technicians in KKM Hospitals. There were significant associations between depressive status and decision authority (p=0.039) and social support (p=0.001). However, there were no significant associations between depressive status and skill discretion, psychological demand, hazardous condition, and physical demand.

Table 14. Psychosocial Job Risk Factors of Depression in 71 Laboratory Technicians in KKM Hospitals

Psychosocial job factors	Depressed		Non-Depressed		p value[a]
	No.	%	No.	%	
Skill Discretion					
Low	18	48.6	19	51.4	0.096
High	10	29.4	24	70.6	
Decision Authority					
Low	26	44.8	32	55.2	0.039 [b]
High	2	15.4	11	84.6	
Psychological Demand					
Low	13	34.2	25	65.8	0.414
High	14	43.8	18	56.2	
Social Support					
Low	12	63.2	7	36.8	0.001
Moderate	14	48.3	15	51.7	
High	2	8.7	21	91.3	
Hazardous Condition					
Low	12	30.0	28	70.0	0.065
High	16	51.6	15	48.4	
Physical Demand					
Low	13	34.2	25	65.8	0.414
High	14	43.8	18	56.2	

[a] χ^2 – test

[b] Fisher's exact test

Table 15 shows the results of multiple logistic regression analysis of risk factors of depression in 71 laboratory technicians in KKM Hospitals. The adjusted odds ratio of having depression for low decision authority was 9.7 times higher than high decision authority (95% CI 1.0 – 91.1). The adjusted odds ratio of having depression for low social support was 14.8 times (95% CI 2.4 – 89.3) and moderate social support was 10.7 times (95% CI 2.0 – 59.0) higher than high social support. However, there was no association between hazardous condition and depression although hazardous condition was included in the final model.

Table 15. Multiple Logistic Regression Analysis of Risk Factors of Depression in 71 Laboratory Technicians in KKM Hospitals

Risk Factors	Crude Odds Ratio[a]	Adjusted Odds Ratio[b]	95% Confidence Interval	p value[c]
Decision Authority				
High	1.0	1.0		
Low	4.5	9.7	1.0 – 91.1	0.048
Social Support				
High	1.0	1.0		
Moderate	9.8	10.7	2.0 – 59.0	0.006
Low	18.0	14.8	2.4 – 89.3	0.003
Hazardous Condition				
Low	1.0	1.0		
High	2.5	3.2	0.9 – 10.2	0.054

[a] Simple logistic regression
[b] Multiple logistic regression: adjusted for age, sex, ethnic group, marital status, educational level, and income per month
[c] Likelihood-ratio test, $\alpha < 0.05$

The final model of risk factors of depression in laboratory technicians in KKM Hospitals using multiple logistic regression was checked for fitness using Hosmer-Lemeshow goodness-of-fit test. The p value was not significant, thus the model was fit. The main effect of the model was also checked for interactions by using 2-ways interactions test and if this was not significant thus there were no significant interactions between each variable in the final model.

CHAPTER FIVE
DISCUSSION

5.1: Prevalence of Job Strain in Laboratory Technicians

Occupational stress can be evaluated as job strain, which is a combination of high demands at work with low decision latitude or control. According to Karasek's Job Control Demand model, it is proposed that job demand and decision latitude need to occur simultaneously in order to produce psychological strain (Karasek & Theorell, 1996). This model also proposes that the high demand-low decision latitude will cause job strain and may inevitably lead towards illness (Theorell, 1997).

The job strain model as conceptualized by Karasek and Theorell postulates that a combination of high psychological demand with low control at work leads to mental and physical illness. Previous studies have linked job strain to hypertension, cardiovascular disease, cigarette smoking (Schnall *et al.*, 1994), psychosomatic symptoms, depression (Landsbergis *et al.*, 1992), and adverse birth outcomes (Mackey *et al.*, 2000). This hypothesis was proven in multiple studies (quoted in Steven, 1997); in 1996, the European Survey on Working Conditions found that the majority of workers experiencing 'high strain' jobs complain about their health or safety being at risk. This result does not change over time. As a contrast to this situation, workers in active work situations report significantly lower percentages of complaints: 36% in 1991 and 22% in 1996 (Steven, 1997).

It is not only the psychological demands of work that lead to stress and related illnesses, but a situation of high demand combined with low worker control (high strain) over the work process. Job strain occurs when workers are constrained from responding to the stressor on the basis of their own optimal psychological and physiological response pattern, because of external factors over which they have no control (Karasek and Theorell, 1996).

Karasek and coworkers have developed a measure of "job strain" that assesses the interaction between a worker and the job environment. The authors hypothesized that job strain leads to the development of coronary artery disease. Karasek and coworkers (1981) found that this measure of job strain was correlated with cardiac death in a cohort of Swedish men. In contrast, using this same measure of job strain, Hlatky *et al.* (1995) found that job strain was not correlated with the prevalence or severity of coronary artery disease in a cohort of patients undergoing coronary angiography.

Based on Karasek's Job Strain Model, this study found that the percentage of laboratory technicians in HUSM classified as experiencing high job strain (33.3%) was higher than laboratory technicians in KKM Hospitals (26.8%). However, this difference was not significant – it may be due to small sample size and the difference between the groups was unable to be detected. The possible reasons why the prevalence of high strain was higher in laboratory technicians in HUSM as compared to KKM Hospitals were due to the age of the workers and also marital status. We found that laboratory technicians in HUSM were generally younger and being non-married (single or divorced) compared to those in KKM Hospitals.

Kalimo *et al.* in 1987 found that the high strain was depends also on the age of the workers. Reaction to stress at different ages can be assessed through the physiological responses-endocrine, cardiovascular, and respiratory-and the behavioral responses-lowered performance rate, increase in errors, fatigue, impaired coordination, and changed emotional activity (Kalimo *et al.*, 1987). However, data on age-related differences in reactions to stress are actually limited. Further investigations are needed to clarify the differences in responses to stress between different age groups under natural working conditions (Keutmann and Mason, 1971).

Barnett *et al.* (1987) quoted a study by Bernard Bloom and his colleagues in 1978 in which they carried out a comprehensive review of stress and marital conflict. They reported that non-married (divorced and separated) people contribute disproportionately to the numbers of job strain, whereas married people are underrepresented in the population. Divorced and separated groups also are 4.5 times more likely to become alcohol dependent than married persons. Furthermore, divorced, separated, or widowed persons generally have substantially higher rates of illness and disability than married persons.

In this study, among valid responses to job strain questions, we found that 11.9% of laboratory technicians in HUSM was categorized as active group, 17.9% as low strain group and the majority (36.9%) was in passive group. Similar distribution of job strain group for laboratory technicians in KKM Hospitals, in which 19.7% was categorized as active group, 23.9% as low strain and the majority (29.6%) was in passive group. These findings were similar to those by Rhee (1999) among Korean workers.

According to this model, laboratory technicians were supposed to be classified under the high job strain group (Karasek and Theorell, 1996). However, our results indicated that the laboratory technicians in HUSM and KKM Hospitals were mainly in the passive group (36.9% and 29.6%, respectively) and high strain group (33.3% and 26.8%, respectively). In addition, although Karasek's Job Strain Model has been used widely in workplaces, it is limited by its focus on only job demands as a source of stress at work. This measure does not assess other

sources of stress that might arise from employment, such as low job security, inadequate pay, interpersonal conflicts with coworkers or supervisors, irregular schedules or physical demands.

5.2: Psychosocial, Occupational and Demographic Factors of Job Strain in Laboratory Technicians in HUSM and KKM Hospitals

In this study we found that the "high strain" group of laboratory technicians in HUSM had significantly higher for toxic exposures, total psychological stressors, and total physical stressors compared to the "non-high strain" group. They also had significantly longer average duration of work (hour) compared to those in "non-high strain" group. For the "high strain" group of laboratory technicians in KKM Hospitals, they had significantly higher for hazardous conditions, toxic exposures, total psychological stressors, total physical hazard, and total physical stressors compared to the "non-high strain" group and they also had significantly younger in age (18 – 34 years) (42.1%) compared to those in "non-high strain" group (7.7%). These findings were supported by Karasek and Theorell in 1996 in their proposed dominant "job strain" model of psychosocial job characteristics.

However, there is some debate about whether the job demand dimension predicts health. A review by Schnall *et al.* (1994) found significant associations between job control and cardiovascular outcomes in 17 out of 25 studies (68%), whereas associations with job demands were found in only eight of 23 studies (35%). Several recent sub studies are described from the Whitehall II study, a cohort study of 6,895 male and 3,414 female London-based civil servants, aged 35-55 years at baseline also showed that poor health was associated with lower job control but not with high job demands (Bosma *et al.*, 1997).

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 (Schnall *et al.*, 2000). Kalimo et al. (1987) quoted a study by El-Batawi in 1981 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. Other workplace characteristics that have been identified in laboratory technicians are monotonous and repetitive work, work overload, exposure to various hazardous, inadequate staffing and resources, and involuntary overtime (Bureau of Labor Statistics, 1995).

5.3: Risk Factors of Job Strain in Laboratory Technicians in HUSM and KKM Hospitals

Identifying the risk factors of job strain could lead to early prevention. Prevention of job strain includes measures that interrupt or slow the progression of illness (Mausner & Kramer, 1985). Identifying and modifying risk factors of job strain at a susceptible stage may prevent the occurrence of job strain.

In this study we found that the significant risk factors of job strain in laboratory technicians in HUSM were job insecurity, physical exertion, and total psychological stressors, compared to laboratory technicians in KKM Hospitals, that physical exertion and total psychological stressors as a significant risk factors of job strain.

The odds of having job strain for laboratory technicians in HUSM with high physical exertion was 1.7 and for KKM Hospitals, 1.2 times 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 (Rice, 1999). It has been shown that physical over-activity, such as increase loading during working, considerably enhances cortisol, adrenaline, and noradrenaline secretion levels. Studies have shown that corticosteroid and catecholamine secretion levels increased in people doing hard physical work (Kalimo *et al.*, 1987).

The odds of having job strain for laboratory technicians in HUSM with high total psychological stressors was 3.6 and for KKM Hospitals, 2.5 times higher compared to low total psychological stressors. Even though psychological stressor is characterized 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 (Rhee, 1998). Karasek *et al.* (1983) have operationally defined psychological stressors 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 (Caplan, Cobb, French, Van Harrison & Pinneau, 1975; House, Wells, Landerman, McMichael & Kaplan, 1979) (quoted in Karasek *et al.*, 1983).

This study also found that job insecurity was a significant risk factor of job strain in laboratory technicians in HUSM. Job insecurity was faced by the employee when the threat or reality of job was terminated or layoff. The psychological stress of job insecurity has been hypothesized 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 undertaken by Brenner (1971), Catalano and Dooley (1977), and Eyer (1977) (Karasek *et al.*, 1983).

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 (Sauter *et al.*, 1989). 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. Research has found that it is the influence resulting from participation, rather than participation per se, which affects job stress and health (Israel *et al.*, 1989). For example, Jackson (1983) found that participation had a negative effect on perceived job stress, and a positive effect on perceived influence. This, in turn, influenced emotional strain, job satisfaction, absenteeism, and turnover intention.

Although stress experience is individualized, 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 (Behjat, 2000).

5.4: Prevalence of Depression in Laboratory Technicians in HUSM and KKM Hospitals

We found that higher proportion (59.5%) of laboratory technicians in HUSM experienced depression than those in KKM Hospitals (39.4%). The reason for higher prevalence of depression in laboratory technicians in HUSM is because laboratory technicians in HUSM have higher job strain (33.3%) compared to those in KKM Hospitals (26.8%), higher stress levels lead to higher prevalence of depression. These findings were similar to those study conducted among employees who involved in the Health Promotion Program at the worksite located in the Northeastern United States, the researchers found that 13% were experiencing job-related depression and 11.25% were experiencing symptoms associated with job stress and they found a relationship between stress and depression among workers that can directly influence worker satisfaction (Dunnagan *et al.*, 2001).

Karasek *et al.* (1981) have been examining that job conditions were associated with impaired health. According to their research, the most stressful set of job conditions combines having a low level of decision latitude – for example, having little control over the pacing of tasks

or the allocation of resources – and having highly psychologically demanding tasks, such as those that have time pressures, dead-lines, large workloads, and conflicting or heavy emotional demands. This "high-strain" combination is related to elevated risk for such negative health outcomes as coronary heart disease and depression. Presumably the high level of demands creates arousal and the inability to exert control leads to frustration.

This is consistent with the findings from Mausner-Dorsch and Eaton (2000), that high job strain was associated with greater prevalence of all forms of depression. They were also able to evaluate the relation between occupational strain and depression with population-based data instead of with data from clinic or other selected populations. The results also confirm the importance of the demand-control model for depression by providing a theoretical framework to explain the relation between the psychosocial characteristics of the work environment and depression as health outcomes.

In studying the relationship between the individual and work, special attention is usually given to job conditions. Job characteristics, work surroundings, and organization of work, often remain beyond to reach of change. This is due principally to the fact that it is technically, economically, and politically far more difficult in practice, to influence the organization of work rather than to alter job conditions. The term job conditions are physical job conditions (e.g., noise, temperature, lighting), chemical conditions (e.g., vapor, dust), and biological conditions (e.g., bacteria, viruses). The term organization of work means the division of labor, mode of operation and work pace, and the way in which each worker is assigned a place and function. The organization of work conflicts with the psychological functioning of the individual at every point, and it can be understood that depressive states may arise from the mode of organization of work. Clinical investigations have effectively demonstrated that assembly-line workers do not experience the same type of depression as office workers (Kalimo *et al.*, 1987). Furthermore, Hammen (1997) has proposed that certain individuals may be particularly vulnerable to some stressors more than others.

5.5: Risk Factors of Depression in Laboratory Technicians in HUSM and KKM Hospitals

Identifying risk factors of depression could lead to disease prevention. Prevention means inhibiting the development of a disease before it occurs and includes measures that interrupt or slow disease progression. Primary prevention is prevention of disease by altering the susceptibility or reducing the exposure for susceptible individuals, while secondary prevention is early detection of depression and its successful early treatment (Mausner & Kramer, 1985).

Identifying and modifying risk factors of depression at susceptible stage may prevent the occurrence of depression.

In this study, we found that the main risk factor of depression in laboratory technicians in HUSM and KKM Hospitals was low social support. Costello (1982) described several studies have shown specifically that when stress at work occurs, workers who lack a supportive intimate relationship with another person are significantly more likely to develop depression (Costello, 1982). Research has explored the role of actual supports as well as perceptions of support, and the role of the size of social networks. Additionally, the mechanisms of the effect continue to be explored, with support both for a buffering effect (support reduces the likelihood of depression in the face of stress) and a main effect (both low support and stress independently predict depression). However, this voluminous research field is beyond the scope of this discussion.

Of particular importance to the prediction of depression, investigators have found that depressed people have fewer supportive relationships and that depressed persons perceive less support from the relationship that they do have (Hammen, 1997). As Blazer *et al.* (1994) have speculated, depressed individuals may alienate those close to them because of their excessive demands for support – a process that elicits rejection that in turn serves to intensify or maintain depression.

Lack of social support can also contribute to the development of job strain, because opportunities to benefit from the positive (healthy) social contacts are reduced. Particularly with regard to 'people's work', which often implies intensive emotional experiences, social support from colleagues and superiors may help the workers to cope effectively with these experiences. A recent meta-analytic study provides evidence for the relationship between demands (workload) and lack of resources (limited social support) on the one hand, and emotional distress on the other. Social support from colleagues and supervisors can be very helpful in reducing and preventing emotional distress (Janssen *et al.*, 1999).

Cheng *et al.* in 2000 also reported that poor social support at workplace had significant impact on work-related disease and will contribute towards ill health. Lack of social support has also been shown to have psycho-physiological correlation, for instance, those reporting low social support at work have a high heart rate throughout the day and night and raised systolic blood pressure during working (Theorell, 1997).

A study conducted by Dunnagan *et al.* in 2001 also proved that work-related depression is a product of stress and job dissatisfaction. Lack of social support and resources, little control and autonomy on the job, and unfair and overly demanding workloads and expectations can breed depression. Because of the strong association between the development of depression and the

psychosocial work environment, businesses that contribute to negative employee affect may incur significant decreases in productivity, quality, and profit due to increases in absenteeism and turnover. These are consistent with the findings from Revicki *et al.* in 1993 that anger, depression, work stress, and job satisfaction are highly related. They also found a direct relationship between stress and depression and they concluded that employee emotions were closely linked to perceptions of social support and resource availability in the workplace.

Other risk factor of depression in laboratory technicians in HUSM was high psychological demand. The adjusted odds ratio of having depression for high psychological demand was 3.0 times higher compared to low psychological demand.

However, there is some debate about whether the job demand dimension predicts health. A review by Schnall *et al.* (1994) found significant associations between job control and cardiovascular outcomes in 17 out of 25 studies (68%), whereas associations with job demands were found in only 8 of 23 studies (35%). In the Whitehall II study, a cohort of 6,895 male and 3,414 female London-based civil servants aged 35-55 years at baseline also showed that poor health was associated with lower job control but not with high job demands (Bosma *et al.*, 1997).

A slightly modified demand-control model shows strength in characterizing the association between the psychosocial job factors and the depression. From this study, it showed that skill discretion was not related to depression but decision authority has a significant finding as a risk factor in regard to depression in the laboratory technicians in KKM Hospitals. Decision latitude might therefore be a very valuable construct for other health concerns (such as cardiovascular disease) but not for depression. This is in line with the results of Mausner-Dorsch and Eaton (2000), which tested a similar pattern of relationship between psychosocial work environment and depression.

Karasek and Theorell (1996) suggested that psychosocial job factors could be the next strongest set of predictors of health and illness after age in an extensive investigation of the relationship between work and non-work factors on illness and illness behavior. Additionally, a concept commonly supported in the job-stress literature has been that the lack of certain job factors contribute towards certain stress-related health problems. One of the related study was conducted by Baba and Schwind in 1990 who examined how work and non-work factors influenced mental health among Japanese workers.

Our results suggest that each factor in the psychosocial work environment separately provides a better evaluation than does combined exposure to psychological demands and decision latitude when evaluating the effect of psychosocial factors at work on depression.

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

6.1: CONCLUSION

The prevalence of job strain among laboratory technicians in this study did not support the prevalence as hypothesized by the Karasek's Job Strain Model. We found that the majority of the laboratory technicians in HUSM and KKM Hospitals were classified under the passive group. However, the proportion of high strain group was the second highest after passive group in laboratory technicians in both HUSM and KKM Hospitals.

In this study, we were able to show significant associations between job strain and job insecurity, physical exertion and total psychological stressor in laboratory technicians in HUSM. However, the significant risk factors of job strain for laboratory technicians in KKM Hospitals were physical exertion and total psychological stressor only.

In this study also, we found differences in the prevalence of depression between laboratory technicians in HUSM and KKM Hospitals. Significantly higher proportion (59.5%) of laboratory technicians in HUSM were depressed compared to those in KKM Hospitals (39.4%). We also found significant associations between depression and low social support and high psychological demands in laboratory technicians in HUSM. However, for laboratory technicians in KKM Hospitals, the significant association was between depression and low social support and low decision authority.

Low social support was highly significant as a risk factor of depression and this study reconfirmed that poor social support at workplace had significant impact on work related disease and will contribute to ill health effect. Social support from colleagues and supervisors can be very helpful in reducing and preventing emotional distress.

We therefore conclude that physical exertion and total psychological stressor in the workplace posed significant risk of job strain in laboratory technicians in HUSM and KKM Hospitals. Job insecurity also significantly affected job strain in laboratory technicians in HUSM. A higher proportion of laboratory technicians in HUSM experienced depression compared to those in KKM Hospitals. Low social support positively predicted depression in laboratory technicians in HUSM and KKM Hospitals. In addition, high psychological demand also significantly predicted depression in laboratory technicians in HUSM; however, in laboratory technicians in KKM Hospitals, low decision authority was the significant predictor of depression.

6.2: RECOMMENDATIONS

Based on findings in this study, we propose the following:

1. The original questions should be evaluated further and questions reflecting new domains in the model should be added. In addition, measures of other relevant work conditions (physical exertion, physical work hazards), non-work (family), demands, latitude and support need to be standardized and included in the questions to determine job strain.
2. Additional psychological measures (such as detailed symptom of depression) and questions regarding personality trait should be included in studies to develop a better understanding of the mechanisms by which job strain leads to depression.
3. Expanded Job Content Questionnaire, including subjective and objective measures of job characteristics, work histories, social support, and other work environment variables should be developed, so that valid assessments of the health impacts of job stress can be made.
4. Job strain assessment instruments should be included in workplace health surveillance programs.

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