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Research paper

Association between Psychosocial Factors and the Prevalence of Musculoskeletal Disorders among Internship Doctors in Malaysia

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Abstract

Musculoskeletal disorders (MSDs) have been recognized as one of the main occupational health problems among health care workers. Many studies have suggested the influence of psychosocial factors on MSDs. The objective of this study is to look into the association between psychosocial factors and the prevalence of MSDs symptoms among internship doctors. 86 internship doctors completed a questionnaire which consists of demographic data, physical and psychosocial factors as well as musculoskeletal discomfort. Results show that 32.6% of them reported that they have musculoskeletal discomfort at a single body region during the last year, 16.3% reported two regions and 9.3% reported three regions where the most prevalent region affected was the neck area where 27.9% of the respondent reported they experienced symptoms or pain in this region, followed by wrists / hands (26.7%), lower back (19.8%) and upper back (14.0%). Meanwhile, there were association found between psychosocial factors and prevalence of MSDs in certain body regions. For instance, musculoskeletal symptom at neck, wrist/hands, upper and lower back regions have been found to be associated with five psychosocial stressors examined in this study. The results obtained indicate the influence of psychosocial factors on MSDs.

Keywords: *Internship doctor; Musculoskeletal disorders; Physical factors; Psychosocial factors; Questionnaire.*

1. Introduction

Healthcare personnel especially for those who are working in hospital settings are vulnerable to a wide range of hazards. Aside from working indoors with potential exposure to a variety of diseases and toxic chemical agents, health care personnel especially doctors need to perform their job under very stressful working environment [1-4]. For instance, their job involves not only other people's life but they are also exposed to legal or illegal consequences such as being sued or threatened by their patients. Moreover they are in the front line who need to deal with undiagnosed airborne disease, vulnerable to other blood transfusion disease (for example, in the case of accidental needle puncture injury while handling patients etc) and at risk of unexpected factor (such as unruly patients). Furthermore, young hospital doctors especially those who are on their internship period, work excessively long hours, do not have enough rest as well as sleep and need to work under high pressure caused by not only their patients (and families) but also by their immediate supervisor (medical officer and specialist) [1,5]. Other elements during the period of internship in Malaysia include ward rounds, patient (and families) consultations, exams and report writing. Basically, there are many psychosocial factors involved in internship doctor's occupation.

All the factors mentioned may contributed to high psychosocial stress among internship doctors and raises some concerns on the internship doctors' health especially regarding the musculoskeletal disorders (MSDs). MSDs are defined as health problems of the musculoskeletal systems such as muscles, tendons, skeleton and ligaments [6]. MSDs are well-known health problems for all profession all over the world including health care worker. It is estimated that nearly one-third of sick leave cases among health care workers are associated with MSDs [7]. It can be ranging from light, mild and infrequent; to severe, irreversible and disabling injury [6,8-9]. The significant effects of psychosocial stress such as time pressure, low social support, high job demands and high mental workload on MSDs have been reported in various occupational fields such as dentists and offshore oil installation workers [10-11]. However, at the same time, there are other studies also reported that psychosocial stress did not have significant effect on the prevalence of MSDs. For example, there were studies found that psychosocial factors influence the prevalence of MSDs among dentist [10,12] while another study found inconsistency influence of psychosocial factors on MSD complaints and chronicity among dentist [13]. The same inconsistency was found in studies regarding the influence of psychological and psychosocial factors on MSDs for construction workers [14-17].

Doctors (in internship period) in Malaysia are not only constantly exposed to a great deal of psychosocial factor but also to physical factors. For instance, internship doctors especially for those who are working in Orthopedic department frequently need to assist their supervisor (medical officer or specialist) to do major operation. Sometimes, during operation, they need to assist by holding the patient's leg in an awkward posture in order to allow their supervisor to perform the operation. All these factors will increase and might contribute to the MSDs.

There are many studies regarding prevalence of MSDs among healthcare personnel. However, most of the studies only focused

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on nurse, dentist, surgeons and physical therapists and mainly concentrated on low back pain and the relationship with physical factors [7, 18-19]. Only a few of the studies (if any) focused on general doctor especially on the young medical doctors who undergo their internship. Furthermore, a study that involved psychosocial factor is rarely explored. Besides, the relationship between psychosocial factors and MSDs are still debatable. Therefore, one of the purposes of this study is to provide a general picture of the perceived MSDs problems among internship doctors and their relationship with psychosocial factors. Nevertheless, the role of physical factors on musculoskeletal disorders is well known and has been recognized for decades. Therefore, physical factors has been included as part of this study.

2. Methodology

Each participating internship doctor was provided with some information needed for this research as well as a 5-page survey. The survey was divided into four sections, which are: background information, physical factors, psychosocial factors, and finally musculoskeletal symptoms. The only criterion of eligibility to participate in this study was to have at least 12 months experience working as an internship doctor. The survey has been distributed to almost 300 internship doctors in several hospitals in Malaysia.

The background information collected were regarding their gender, age, height, weight, years of practice, and duration of work per week. Meanwhile, physical factors section covers issues on their main working position, whether they do stretching exercise during breaks, the rate of occurrence of them having to work physically very fast (their working pace), physically very hard (such as lifting patient, lifting or carry heavy load), use vibrating tools and working in awkward postures.

Psychosocial factors surveyed in this study are from Generic Job Stress Questionnaire developed by the National Institute for Occupational Safety and Health (NIOSH)[10, 20-21]. It is divided into six different categories which included job requirements (8 items), intragroup conflict (3 items), mental demands (5 items), job satisfaction (4 items), workload and responsibility (8 items) and finally work hazards (4 items). Content analysis has been done for validity test. The Cronbach's alpha for psychosocial factors ranged from 0.75 to 0.86.

Standardized Nordic Questionnaire (SNQ)[22], a reliable and valid questionnaire was used to provide information regarding the prevalence of musculoskeletal symptoms perceived by the internship doctors. In SNQ, respondents were provided with a body diagram, which was divided into nine regions. This diagram was used as an aid to the respondents in order to identify any problems such as ache, pain or discomfort experienced by them for the last 12 months.

Statistical Package for Social Sciences (SPSS) version 17 has been used for statistical data analysis. Means and standard deviations (SD) were calculated for continuous variables. Meanwhile, frequencies as well as percentages were computed for categorical variables. Significant differences for prevalence of MSDs were examined by means of analysis of variance (ANOVA) for continuous variables and the chi-square test for categorical variables. However, if the assumption for chi square analysis is no met, Fishers' exact test (FET) analysis was used for categorical variables.

This study is registered with the National Medical Research Registration of Malaysia with identification number NMRR-15-1578-27429 and has been exempted from an ethics review by the Medical Research Ethics Committee of Malaysia.

3. Results and Discussions

3.1. Demographic Data

In total, there were 91 internship doctors participated in this study. However, five of the collected surveys did not answer important questions such as questions regarding musculoskeletal symptoms or psychosocial factors and consequently excluded from the analysis. Body mass index (BMI) used in this study was based on Ministry of Health (MOH) Malaysia's guidelines [23] where the cut-off point used for BMI is lower compared to BMI cut-off point used by World Health Organization (WHO). This is based on evidences which show that Asian subjects have a higher percentage of body fat at similar BMI cut-off point compared to Caucasians subjects [23]. Demographic data of the participants in terms of mean, standard deviation and percentages are summarized in Table 1.

Table 1: Demographic data of the participants

	Mean	SD	No. of participants	%
Age (year)	26.0	0.55		
Height (cm)	160.0	7.61		
Weight (kg)	57.2	10.67		
Working time per week (hour)	72.3	10.5		
BMI (kg/m^2):				
Underweight (< 18.5)			8	9.3
Normal (18.5–22.9)			44	51.2
Pre-obese (23.0–27.4)			33	38.4
Obese (27.5–34.9)			1	1.2
Gender:				
Male			40	46.5
Female			46	53.5
Marital status:				
Single			84	97.7
Married			2	2.3

3.2. Musculoskeletal Symptoms

Among 86 (or 100%) internship doctors participated in this study, 32 (or 37.2%) of them were free from any musculoskeletal symptoms over the preceding 12 months. Meanwhile, 28 (or 32.6%) of them reported that they have musculoskeletal discomfort or pain symptoms at a single body region during the last year, 16.3% reported two regions, 9.3% reported three, followed by 2.3%, 1.2%, and 1.2% reporting four, five and six regions respectively. It is difficult to directly compare the result with other studies since there were only a few studies focusing on MSDs on young medical doctors and especially on internship doctors. However, if it is compared to studies on physicians, the results obtained from this study are consistent with previous studies where 20% to 68% of the physicians in India, China and Iran reported that they had MSD symptoms [7-8, 24-25].

Over the preceding 12 months, the most prevalent region affected was the neck area (29%), followed in descending order by the wrist/hands (28%), lower back (20%), upper back (13%), ankles/feet (12%) and knees (6%). None of the doctors reported musculoskeletal pain at the elbows and hip/thighs. Unlike dentist, in this study, doctors have been reported only to rarely work in awkward posture. Thus, awkward posture should not be a main cause for high prevalence of MSD especially at the neck region. Further analysis by statistical method which showed the influence of psychosocial stress will be explained in the next subsection.

The highest percentage of participants reported that the symptoms prevented them from performing their normal activities when symptoms were present at three of the nine regions. The three regions are the neck and wrist/hands (5.8%), followed by upper and lower back (4.7%) and finally ankles/feet (1.2%). None of the participants reported they encountered problems to perform their normal activities at those times when symptoms were present at other body region.

Meanwhile, based on Chi-square and Fisher exact test analysis, none of the physical factor has been associated with musculoskeletal symptom among doctors except one. Based on the results of the analysis, lower back pain has been found to be significantly associated with awkward posture ($p = 0.038$).

3.3. Physical and Psychosocial Factors

None of the participants answered sitting as their main working position. Most of them (58.1%) stated that they were mainly standing during working while 32.6% reported their working position was mainly walking. Although there were only three answer choices which are "mainly sitting", "mainly standing" and "mainly walking", some of the participants (9.3%) answered both "mainly standing" and "mainly walking" for their working position.

Besides that, none of the participants get proper rest or take breaks during working hours. It is understandable since most of them (75.6%) reported that they have a lot of work load while the rest reported they have "a great deal" of work load. Meanwhile, only a small percentage of the participants (34.9%) did stretching during work breaks.

With high work load and inadequate time to do it, more than half (54.7%) of the doctors often need to work physically very fast. Meanwhile, although they work in health line, it seems the doctors did not need to do something that physically very hard such as lifting patient. Most of the participants (90%) reported that they were occasionally or rarely need to work physically very hard. Besides that, unlike dentist, most of the doctors (97%) also reported that they rarely and occasionally need to work on awkward posture.

Meanwhile, in this study, six categories of psychosocial factors have been examined (refer Table 2). The level of stress perceived by the doctors was evaluated for each category and separated into low, medium and high. No statistic was computed for elbows and hips/thighs because the data belong to only one group (constant).

In all categories, majority of the participants belong to low/medium stress. However, further examination on the effect of psychosocial stress on MSDs among internship doctors shows that although most of the participants belong to the low/medium stress group, statistical analysis found certain significant association between level of stress and musculoskeletal symptom among the doctors.

Statistical analysis showed the significant effect of level of stress on certain body region. Five of the psychosocial stressors studied in this survey have been significantly associated with neck, upper and lower back pain and discomfort. Meanwhile, three of the psychosocial stressors studied in this survey have been significantly associated with wrist/hands pain and discomfort.

Based on t-test and ANOVA analysis, none of the demographic data such as gender, marital status and BMI were significantly associated with psychosocial stress perceived by the doctors.

As mentioned, the highest prevalence of MSD among the doctors in this study was on the neck region. Five of the psychosocial stressor studied in this survey especially mental demand seems to be significantly associated with musculoskeletal pain and discomfort at neck region. Typically, the influence of psychosocial factors on MSDs was low and was disregard compared to physical activity.

However, psychosocial stress may play a role on muscle activity. Psychosocial stress may activate low threshold muscle activity. Continuous activation of the muscle might disturb metabolic process, escalate pain sensitivity and hinder repairing process of damaged muscle fibres [26-27].

In this study, a musculoskeletal symptom at neck region was associated with not only one but five psychosocial stressors. The combination of these five psychosocial stressors may increase the stress felt by the doctors, activate low threshold muscle activity continuously and consequently influenced significantly musculoskeletal symptoms at neck region among the doctors.

The same mechanism could also happened on upper and low back. Most of the internship doctors in this study reported to be occasionally work physically very hard such as lifting patient or heavy load and rarely work in awkward posture. Although they often work very fast but it should not be a significant factor on upper and lower back musculoskeletal problems. However, like neck, both of these regions also have been found to be significantly influenced by five of the psychosocial stressors.

In contrast to neck, musculoskeletal problems at wrist/hands region only significantly associated with three psychosocial stressors. In addition, the strength of relationship between those three stressors and prevalence of MSDs at wrist/hands region were small and medium only. Yet, prevalence of MSD symptom at wrist/hands region was almost the same as at neck region. Therefore, besides those three stressors, physical factor may also play a role in prevalence of MSDs symptom at wrist/hands region.

Although it is not included in the survey, it is known that internship doctors need to use their hand frequently in their work. For example, aside from writing report, they need to help the surgeons while doing operation by holding the instrument or patients' body part. They also need to withdraw patients' blood, insert IV line and suturing. With more than half of them reported that they often need to work physically very fast, it will not be strange for them to accidentally injure their hand. Furthermore, their working hours per week are very long. With average 72.5 working hours per week, it is almost double compared to normal working hours for office workers. Longer working hours may increase the probabilities for them to injure their hand.

Table 2: Percentage and number of internship doctors in the low, medium and high stress groups, and their association with prevalence of MSD symptoms at specific body parts[1]

Psychosocial stressor	Low stress, % (n)	Medium stress, % (n)	High stress, % (n)	Chi square / Fisher's exact test (p value and effect size)						
				Neck	Shoulders	Wrist/ hands	Upper back	Lower back	Knees	Ankles/ feet
Intragroup conflicts	87.2 (75)	12.8 (11)	0 (0)	FET, p = 0.066	FET, p = 1.000	FET, p = 1.000	**FET, p = 0.043 small**	**FET, p = 0.037 small**	FET, p = 1.000	FET, p = 0.627
Work hazards	55.8 (48)	43.0 (37)	1.2 (1)	**FET = 17.746 p < 0.000 large**	FET = 1.008 p = 1.000	FET = 5.298 p = 0.054	FET, p = 0.441	**FET = 9.685 p = 0.004 med**	FET = 1.865 p = 0.669	FET = 0.914 p = 0.781
Job satisfaction	48.8 (42)	45.3 (39)	5.8 (5)	**FET = 16.938 p < 0.000 large**	FET = 1.941 p = 0.370	**FET = 10.430 p = 0.005 med**	**FET = 7.272 p = 0.023 med**	FET = 0.718 p = 0.823	FET = 3.374 p = 0.149	FET = 1.011 p = 0.572
Job requirements	0 (0)	76.7 (66)	23.3 (20)	**χ^2 = 17.822 p < 0.000 med**	FET, p = 1.000	**χ^2 = 4.433 p = 0.035 med**	**FET, p = 0.028 med**	**FET, p = 0.021 med**	FET, p = 0.080	FET, p = 0.272
Mental demands	0 (0)	80.2 (69)	19.8 (17)	**FET, p < 0.000 large**	FET, p = 0.654	**FET, p = 0.002 med**	**FET, p = 0.011 med**	**FET, p = 0.004 med**	FET, p = 0.051	FET, p = 1.000
Workload and responsibility	0 (0)	87.2 (75)	12.8 (11)	**FET, p < 0.000 med**	FET, p = 1.000	FET, p = 0.475	**FET, p = 0.007 med**	**FET, p = 0.006 med**	FET, p = 0.121	FET, p = 0.627

[1]Bold indicates significant p value < 0.05 and effect size were based on phi or Cramer's V

It is common for them to hold several patient's files and carrying them everywhere, write notes and record data on the file without a table as a base. Yet, it should be noted that this is just an assumption based on doctors' working nature and long working hours.
Aside from upper body, it seems internship doctors also faced some problems on lower body parts such as ankle and knees. None of the psychosocial stressor has been significantly associated with prevalence of MSD symptoms at ankle and knees. However, this could be understood if we look at work position and working hours. All of the participants stated that they mainly stood, mainly walked or did both for their work position. With almost 73 hours working hours per week and mainly stood or walked as work posture, prevalence of MSDs symptoms at ankles and knees should be expected.

4. Conclusion

Although internship doctor occupation does not involve high physical activity, the results of this study still shows a worrisome prevalence of MSDs especially on neck area. This study also found significant association between several psychosocial stresses and the prevalence of MSD symptoms.

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