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# Risk Factors of Musculoskeletal Symptoms Among Healthcare Workers in a Public Hospital

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## ABSTRACT

**Introduction:** This study aims to determine the risk factors of musculoskeletal symptoms (MSS) among healthcare workers in a public hospital. **Methods:** This cross-sectional study involved 121 respondents among healthcare workers (HCW) (doctors, nurses and physiotherapists) working in Emergency and Trauma Department and Physiotherapy Department in a public hospital by using universal sampling. Self-administered questionnaire containing questions on socio-demographical data, work characteristics, body movement and work tasks, Standardized Nordic Questionnaire for assessing musculoskeletal symptoms and Job Content Questionnaire (JCQ) for measuring psychosocial risk factors was used as the main instrument for this study. **Results:** Response rate was 81.88% and 95% of respondents reported to have at least one symptom at body site. The most prevalent symptom was neck pain (80.2%) followed by low back pain (79.3%), and shoulder pain (71.9%). Physiotherapists reported to have more symptoms of MSS than doctors and nurses ($\chi 2 = 6.84$, $p = 0.033$). For socio-demographic characteristics, only level of education had significant association with MSS ($\chi 2 = 7.25$, $p = 0.008$). Meanwhile, there were 14 body movements and work tasks had significant association (moderate) with MSS. For psychosocial risk factors, high job insecurity was significantly (fair) correlated with more MSS ($r=-0.302$). **Conclusion:** The prevalence of reported MSS at a number of body sites was high which were associated with socio-demographic background, work task characteristics, body movements and work tasks, and psychosocial risk factors.

**Keywords:** Musculoskeletal symptoms, Healthcare workers,Public hospital

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## INTRODUCTION

Musculoskeletal disorders (MSDs) are among the most common reported occupational-related diseases. Statistics showed that MSDs are the second most common reported occupational-related diseases in Malaysia (1). The common musculoskeletal symptoms (MSS) of MSDs are discomforts on the musculoskeletal, peripheral nervous, and neurovascular systems, and people with MSDs with MSDs experience severe muscle pain that causes difficulties in movement or pain in several body parts (2). Findings of a study among surgeon in Iran showed that the prevalence of MSS was high which were in the knees (48.7%), neck (45.8%), low back (42.3%) and shoulders (40.1%) (3). Meanwhile, findings from previous study among healthcare workers in a Private Medical Centre in Malaysia showed that the prevalence of low back pain among them was reported to be the highest (21.4%) followed by shoulder pain (14.6%) and neck pain (13.6%) (4).

In health care setting, MSDs are a common issue among workers as the nature of their work is physically demanding and with several psychosocial hazards they are experiencing, they are more prone to the risk of developing MSDs (5). The healthcare workers usually stand for hours and work in awkward posture (6,7). Their work involves relocating of patients or objects, repositioning patients in beds, pushing or pulling trolleys and things, using computer for administrative works. After a long period of repetitive movements in performing those movements, they are at high risk to get lower back and upper extremity disorders (4). Findings of

a study among Malaysia confirmed that the association between different workplaces and carrying heavy loads with prevalence of back pain among nurses is significant (8). These findings are later supported by another study which clearly stated that work tasks of nurses that mainly include lifting heavy loads by transferring patients from or to beds daily cause them at high risk of developing MSDs (9).

Apart from work, some socio-demographic characteristics identified to be significantly contributed to the risk of MSDs (10). Age was found as a significant risk factor of MSDs in which young and new workers were more susceptible to the risk (11). This relationship is further supported by a study showing that the prevalence of MSDs was highest within the first 5 years of working and was more prevalent among fresh graduate physiotherapists (7). In contrast, findings of another study demonstrated that the prevalent of MSDs for older and younger occupational and physical therapists were comparable, but the older workers may be more at risk to experience severe pain symptoms (12). Moreover, gender also affects the risk of developing MSDs as female staff nurse was more prone to MSDs compared to male staff nurse (2). Similar results were found in other studies among nurses (10, 13). The height and weight also play important roles where people who are tall have relatively pain at their neck besides, people who are overweight were associated with shoulder and neck pain (14). High body mass index (BMI) was found in a previous study to have a significant association with the incidence of low back pain among healthcare workers (10).

MSDs can be characterized as multifactor. Among the factors that have been recognized as contributors to the MSDs symptoms were physical, psychosocial, environmental, and individual factors. Based on Karasek's Job Demand Control Model, high job demand, low decision latitude, low social support, and high job insecurity generates high strain job that trigger the risk for psychological and physical distress (15,16). This model is supported by the findings of a previous study (2) which suggested that social support includes supervisor and co-worker support had moderate correlation with musculoskeletal symptoms among nurses in public hospital. This relationship was supported by another researcher (13). While there are several studies investigated the association between psychosocial factors and musculoskeletal disorders, there are limited number exploring on those factors specific to the healthcare workers.

MSDs increase the financial costs for both workers and companies. These costs may include medical expenses such as hospitalization and rehabilitation which will result into reduced productivity, increase work compensation, and finally affect the economic growth of Malaysia (8). Findings of a previous study in Brunei indicated that MSDs such as back pain, neck pain, shoulder pain and foot pain interfere with the ability of the nurses to work well (6). Moreover, MSDs may lead to increase of the number of sick leaves, declining in performance or in a worse case scenario forcing them to resign from their current work (17,18) or choose to retire at early age which increase social-economic costs (19).
In Malaysia, government healthcare setting is demonstrated among the busiest working environment compared to in many countries that requires their workers to physically active and exposed to the other occupational hazard that contribute to the risk of getting injuries and musculoskeletal disorders (20). Unfortunately, there is a scarce number of published data on MSDs among those healthcare workers. Data published by the Social Security Organization Malaysia (SOCSO) only represents those private companies which contribute to the compensation schemes managed by SOCSO. Meanwhile data published by the Department of Occupational Safety and Health (DOSH) mostly from workplace illnesses and injuries report submitted by industries. More data is needed on the prevalence and distribution of MSDs among this particular study population. This study is therefore aimed to explore the distribution of MSDs prevalence among civil servants, healthcare workers in Malaysia by exploring four main risk factors, socio-demographic factors, work characteristics, body movements and work tasks, and psychosocial risk factors. Findings of this study will help in filling the data gaps on MSDs among government health care workers thus assist in formulating more effective intervention programmes for them.

## METHODS AND MATERIALS

### Study design, study location and sampling

This was a cross-sectional study conducted among healthcare workers (doctor, nurse, physiotherapist) working in public hospital which was Hospital Kuala Lumpur. The hospital was purposively chosen and involved the Department of Emergency and Trauma, and the Physiotherapy Department. The reasons to conduct the study at HKL is that the hospital is the largest medical facility in Malaysia and the government tertiary referral hospital. It is also among the largest hospital in the Southeast Asia and has about 7000 workers (21).
There are 28 clinical departments in HKL. Two departments were selected randomly by fishbowl technique to achieve the required number of respondents. From the technique, the Emergency Department and Physiotherapy Department were selected. Only doctors, nurses and physiotherapists who work in selected departments were invited to participate as their work involved long standing and various awkward positions that put them at risk for MSDs. Only those workers with no history of related musculoskeletal disorders prior to their current employment with a minimum of one year experience working were invited

as respondents. Any existing musculoskeletal disorders among the participants due to other factors such as road accident will indirectly affect the result of the study. Besides, pregnant women and menopause women also were excluded from this study. This group of people tend to develop related musculoskeletal symptoms due to physiological changes in the body. By referring to previous study (13) conducted among 347 Iranian nurses, the prevalence of musculoskeletal symptoms at any site of the body was 95%. Then, sample size is calculated using the formula of Lwanga & Lemeshow (22) with 95% confident interval with precision of 5% with the population size of 7000 for the total number of workers in the study location. The estimated sample size was 73 and after considering an 80% response rate, the study aimed to recruit a minimum sample of 80 healthcare workers.

**Instrumentation and Data Collection**

A set of self-administered questionnaires consisting Section A: Socio-demographic background, Section B: Work characteristics, body movements and work tasks, Section C: Psychosocial risk factors and Section D: Self-assessment of musculoskeletal symptoms, was distributed to all the subjects. In Section A, the information on socio-demography (age, gender, marital status, race, education level, and income) was collected. The body mass index (BMI kg/m2) was calculated based on values of weight and height that were measured on the day of data collection. Section B consist of questions on work-related information (years of employment, working hours per day, static and awkward position, heavy physical work, night shifts, lifting, bending, twisting, pulling and pushing, rest and recovery habit).

In Section C, Job Content Questionnaire (JCQ) was adapted to gather information of various psychosocial aspects of the job. There are 27 items in M-JCQ that consisted of four (4) subscales: job control/decision latitude (DL) (9 items); social support (SS) (8 items); psychological job demand (PJD) (6 items); and job insecurity (JI) (4 items). The items were scored using a Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) and calculated using Karasek's recommended formulae. Higher scores indicate better decision latitude, better social support, more psychological job demand and more job insecurity. The scores for each domain can also be divided into two groups, high and low based on the cut-off points suggested (15,16). The reliability of this questionnaire was shown to be acceptable in previous studies (15,16). In Section D, a Standardized Nordic Questionnaire (SNQ-M) was adapted to assess the symptoms of work-related musculoskeletal disorders (WRMSDs). This standardized questionnaire was based on a previous study (23). In that study, this questionnaire was introduced for the assessment of musculoskeletal symptoms and can be self-administered or used in the interview. The reliability test was conducted on selected population and resulted to be acceptable. There are many recent studies used this questionnaire to assess symptoms of MSDs (2, 7). To facilitate the respondents, a diagram of human body region which comprised of nine body part (neck, shoulders, upper and lower back, hands/wrists, arms, knees, thighs, and feet) was attached for the identification of the part that are having trouble and discomfort. A local study grouped the discomfort in region one (neck, shoulders and upper back), region two (elbows, wrists/hands), region three (low back) and region four (hips, knees, ankles and feet) (2). Based on the manual of the respondents were asked to self-report the discomfort/ pain at the body part listed in the questionnaire for the past 12 months to indicate chronic occurrence and for the past 7 days to indicate acute occurrence of MSS. Respondents shall give answer yes or no for each body part. Higher scores indicate more discomfort (23).

The questionnaire was undergone pre-testing before data collection was conducted by distributing the questionnaire to 13 doctors and nurses from Columbia Asia Hospital Taiping. The pre-testing was used to test the question variation, meaning, task difficulty, timing and overall respondent well-being. The Cronbach's alpha statistic from IBM SPSS Statistic Version 22 as evidence of instrument quality in terms of internal consistency and reliability. The alpha value was 0.71. The observation is made based on job hazard analysis (JHA). In JHA, the researcher observed the working movement of a doctor, a nurse and a physiotherapist for eight hours while they were executing their work tasks. They were randomly selected from each group of occupation. In each task, movements were jotted down and listed. The focus of observation were given on the tasks and movements that may contribute to MSS.

The common body movements that contribute to MSS include bending, straightening, gripping, holding, twisting, clenching and reaching with continual repetition, often in a forceful manner. The tasks that commonly been done by healthcare workers included lifting patient from toilet to bed, and prolonged sitting. This observation was an additional tool to analyse the working characteristics and practices of the healthcare workers.

**Procedure of data collection**

The researcher distributed the informed consent form and questionnaires through the person in charge in every department. Prior to the data collection, a briefing session about the study was conducted. The participants who were interested are given informed consent form and questionnaires to be completed within a given period of two weeks. To maintain the confidentiality of their answer, each participant was also being provided with an envelope. After completing the questionnaire, the questionnaire was returned to the respective person in charge in a sealed envelope provided earlier to be collected by the researcher. Throughout the period, the

participation was voluntary, and the participant may withdraw anytime without penalty or loss of benefit to which the participant is entitled.

### Statistical analyses

The data obtained were analysed by using Statistical Package for Social Science (SPSS) version 22 software. The analysis was completed using descriptive statistics to describe mean, median and prevalence, chi-square analysis to test the association between the outcome measures with categorical variables and correlation test to test the association between the outcome measures with continuous variables.

### Ethical Consideration

Human subject's approval was obtained from the Medical Research and Ethical Committee (MREC), Ministry of Health, Malaysia [NMRR-17-2880-38947(IIR)]. The subjects signed the informed consent form before completing the questionnaire.

## RESULTS

### Response rate

A total of 160 questionnaires were distributed to all healthcare workers, including doctors, nurses and physiotherapists and 131 completed questionnaires were returned. Ten respondents were excluded because they did not fulfil the inclusion and exclusion criteria becoming 121 respondents in total. The response rate calculated was 81.88 %.

### Sociodemographic background

Respondents were aged between 21 to 60 years old. Majority of respondents were female (71.1%), married (55.4%), had number of dependent less than two (81%), Malays (66.1%), had normal BMI (52.1%) and were smokers (95.9%). Most of the respondents graduated with diploma (55.4%) and their household income was less than RM5000 for 54.4% of the respondents. See Table I.

**Table I. Socio-demographic of respondents (n=121)**

| Variables | N=121 f (%) | Mean±SD |
|---|---|---|
| **Age (years)** | | 30.87±6.37 |
| 21-30 | 74 (61.2) | |
| 31-40 | 36 (29.8) | |
| 41-50 | 10 (8.3) | |
| 51-60 | 1 (0.8) | |
| **Gender** | | |
| Male | 35 (28.9) | |
| Female | 86 (71.1) | |
| **Marital Status** | | |
| Single | 54 (44.6) | |
| Married | 67 (55.4) | |
| **No. of dependent** | | |
| 0-2 | 98 (81.0) | |
| >2 | 23 (19.0) | |
| **Race** | | |
| Malay | 80 (66.1) | |
| Chinese | 18 (14.9) | |
| Indian | 15 (12.4) | |
| Other | 8 (6.6) | |
| **Highest Education Level** | | |
| Certificate | 1 (0.8) | |
| Diploma | 67 (55.4) | |
| Bachelor | 50 (41.3) | |
| Master | 3 (2.5) | |
| **Household Income (RM)** | | 6008.08±11887.81 |
| <5000 | 66 (54.5) | |
| 5000-10000 | 41 (33.9) | |
| >10 000 | 14 (11.6) | |

**Table I. Socio-demographic of respondents (n=121) (cont.)**

| Variables | N=121 f (%) | Mean±SD |
|---|---|---|
| **Body Mass Index (BMI)** | | 24.73±4.33 |
| Underweight | 7 (5.8) | |
| Normal | 63 (52.1) | |
| Overweight | 33 (27.3) | |
| Obese | 18 (14.9) | |
| **Smoking** | | - |
| Yes | 5 (4.1) | - |
| No | 116 (95.9) | |

### Prevalence of Musculoskeletal Symptoms

The prevalence of musculoskeletal symptoms (MSS) at any site was 95%. This showed that almost all of the respondents had symptom at least at one site of body region. The most prevalent region was neck (80.2%), followed by low back (71.9%) and shoulders (71.9%). Among doctors in the past 12 months, region that was found to be the most prevalent was also neck (64.5%) followed by low back and shoulders (61.3%) %). For the prevalence of symptoms in past 7 days, low back was the highest (29%) followed by shoulder (22.6%), feet and hips (19.4%).

For nurses, the prevalence of symptoms in the preceding 12 months was found high at neck and low back that was 80% each followed by shoulder (76.7%), and feet (63.3. For 7-days prevalence of symptoms, low back was the highest (53.3%), followed by neck (46.7%), feet and upper back (40%). Meanwhile for physiotherapist, the prevalence of symptoms in the preceding 12 months was found high at neck and low back which was 88.3% each followed by upper back (85%), and shoulder

CONTINUE

(75%). For 7-days prevalence of symptoms, upper back (46.7%) was the highest (53.3%), followed by low back (43.3%) neck (36.7%). See Table II and III.

**Table II. Twelve months prevalence of MSS (n=121)**

| Prevalence at any site = **95%** | | | | |
|---|---|---|---|---|
| **Body Region** | **Doctor** | **Nurse** | **Physiother-apist** | **Total** |
| Neck | 64.5 | 80 | 88.3 | 80.2 |
| Shoulders | 61.3 | 76.7 | 75 | 71.9 |
| Low back | 61.3 | 80 | 88.3 | 79.3 |
| Upper back | 51.6 | 60 | 85 | 70.2 |
| Feet | 48.4 | 63.3 | 48.3 | 52.1 |
| Hips | 32.3 | 50 | 36.7 | 38.8 |
| Knees | 29 | 50 | 51.7 | 45.5 |
| Wrists | 25.8 | 46.7 | 41.7 | 38.8 |
| Elbows | 19.4 | 20 | 30 | 24.8 |

Descriptive analysis

**Table III. Seven days prevalence of MSS (n=121)**

| **Body Region** | **Doctor** | **Nurse** | **Physiotherapist** | **Total** |
|---|---|---|---|---|
| Low back | 29 | 53.3 | 43.3 | 42.1 |
| Shoulders | 22.6 | 36.7 | 31.7 | 30.6 |
| Feet | 19.4 | 40 | 25 | 27.3 |
| Hips | 19.4 | 23.3 | 25 | 23.1 |
| Neck | 16.1 | 46.7 | 36.7 | 34.7 |
| Knees | 16.1 | 36.7 | 30 | 28.1 |
| Upper back | 12.9 | 40 | 46.7 | 40.5 |
| Wrists | 12.9 | 22 | 21.7 | 19 |
| Elbows | 6.5 | 10 | 13.7 | 9.9 |

Descriptive analysis.

### The risk of socio-demographical and work factors on musculoskeletal symptoms

There was a significant association between level of education and MSS (x2 = 7.25, p = 0.008). Value of phi and Cramer's V showed a weak association between them. However, there were no significant association of the other socio-demographic variables (age, number of dependent, household income, BMI, gender, marital status, race, smoking, shift work) with MSS. See Table IV.

There was a significant association between type of occupation and MSS (x2 = 6.84, p = 0.033). Value of phi and Cramer's V showed a weak association between them. However, there were no significant associations between MSS with other work characteristics variables (departments, years of employment and shift work). See Table IV.

**Table IV. Association between socio-demographic and work characteristics associated with MSS (n=121)**

| **Risk Factors** | **N (%)** | |
|---|---|---|
| | **Yes** | **No** |
| **Occupation** | | |
| Doctor | 17 (54.8) | 14 (45.2) |
| Nurse | 23 (76.7) | 7 (23.3) |
| Physiotherapist | 48 (80.0) | 12 (20.0) |
| $\chi$2= 6.84*, *p*= 0.033, phi & creamer's = 0.238 | | |
| **Highest Education Level** | | |
| Certificate & Diploma | 56 (82.4) | 12 (17.6) |
| Bachelor & Master | 32 (60.9) | 21 (39.1) |
| $\chi$2= 7.25*, *p*= 0.008, phi & creamer's = 0.245 | | |

Chi-square analysis. *. Association is significant at the 0.05 level.

### Psychosocial risk factors of musculoskeletal symptoms

In descriptive analyses, to show the frequency and percentage of high and low level of psychosocial risk factors, the five domains of JCQ were grouped using cut-off median of sample. Results showed that 55.4% of respondents experienced high decision latitude, 67.8% had high psychological job demand, 56.2% had high co-workers support, and 86.8% reported high social support and 63.6% perceived high job insecurity. The classification job strain was calculated by using a specific formula and 47 (38.8%) of respondents reported to have high job strain. Continuous data of JCQ was used to see its correlation with MSS which is also a continuous data. Higher scores in each domain of JCQ indicated more psychologically job demand, job insecurity, and job strain and better decision latitude and social support. Results showed that higher job insecurity was found to have correlated with more MSS. However, no correlation were seen between other risk factors and MSS. See Table V.

**Table V. Association between psychosocial risk factors with MSS (n=121)**

| **Risk Factors** | **MSS** | |
|---|---|---|
| | ***r*** | ***p*** |
| **Decision latitude** | -0.052 | 0.570 |
| **Psychological job demand** | 0.040 | 0.662 |
| **Co-worker support** | -0.019 | 0.835 |
| **Supervisor support** | -0.169 | 0.063 |
| **Job insecurity** | 0.302** | <0.001 |
| **Job strain** | 0.091 | 0.318 |

Pearson Correlation. **. Correlation is significant at the 0.01 level (2-tailed).

### Body movements and work task

Fourteen body movements and work task were identified to be significantly associated with MSS. In contrast, lifting patient from toilet to bed, prolonged sitting, neck extension and sleeping behaviour did not had significant association with MSS. The value of phi and Cramer's V showed that there were moderate associations between all the body movements and work tasks with MSS. See Table VI.

**Table VI. Association between body movements and work tasks with MSS (n=121)**

| Risk Factors | N (%) | |
|---|---|---|
| | Yes | No |
| **Manual Handling** | | |
| Never | 1 (25) | 3 (75) |
| 1-2 times a month | 4 (50) | 4 (50) |
| 1-2 times a week | 13 (59.1) | 9 (40.9) |
| Everyday | 70 (80.5) | 17 (19.5) |
| $\chi 2$= 11.362*, $p$= 0.010, phi & Cramer's V = 0.306 | | |
| **Lifting Heavy Load** | | |
| Never | 3 (70) | 7 (30) |
| 1-2 times a month | 7 (46.7) | 8 (53.3) |
| 1-2 times a week | 29 (74.4) | 10 (25.6) |
| Everyday | 40 (86) | 8 (14) |
| $\chi 2$= 19.428*, $p$= <0.001, phi & Cramer's V = 0.401 | | |
| **More than 10 kg** | | |
| Never | 8 (47.1) | 9 (52.9) |
| 1-2 times a month | 7 (50) | 7 (50) |
| 1-2 times a week | 31 (79.5) | 8 (20.5) |
| Everyday | 42 (82.4) | 9 (17.6) |
| $\chi 2$= 12.574*, $p$= 0.006, phi & Cramer's V = 0.322 | | |
| **Less than 10 kg** | | |
| Never | 19 (73.1) | 7 (26.9) |
| 1-2 times a month | 15 (51.7) | 14 (48.3) |
| 1-2 times a week | 26 (86.7) | 4 (13.3) |
| Everyday | 28 (77.8) | 8 (22.2) |
| $\chi 2$= 69.853*, $p$= 0.020 phi & Cramer's V = 0.285 | | |
| **Change position of patient in bed** | | |
| Never | 3 (27.3) | 8 (72.7) |
| 1-2 times a month | 23 (88.5) | 3 (11.5) |
| 1-2 times a week | 11 (52.4) | 10 (47.6) |
| Everyday | 51 (81) | 12 (19) |
| $\chi 2$= 21.235*, $p$= <0.001, phi & Cramer's V = 0.419 | | |
| **Carry patient between bed and chair** | | |
| Never | 5 (50) | 5 (50) |
| 1-2 times a month | 11 (57.9) | 8 (42.1) |
| 1-2 times a week | 24 (68.6) | 11 (31.4) |
| Everyday | 48 (84.2) | 9 (15.8) |
| $\chi 2$= 8.866*, $p$= 0.032, phi & Cramer's V = 0.270 | | |
| **Monotonous work** | | |
| Never | 11 (55) | 9 (45) |
| 1-2 times a month | 15 (60) | 10 (40) |
| 1-2 times a week | 22 (26.7) | 8 (26.7) |
| Everyday | 40 (87) | 6 (13) |
| $\chi 2$= 9.912*, $p$= 0.019, phi & Cramer's V = 0.286 | | |
| **Awkward postures** | | |
| Never | 4 (44.4) | 5 (55.6) |
| 1-2 times a month | 14 (60.9) | 9 (39.1) |
| 1-2 times a week | 24 (68.6) | 11 (31.4) |
| Everyday | 46 (85.2) | 8 (14.8) |
| $\chi 2$= 10.303*, $p$= 0.036, phi & Cramer's V = 0.238 | | |
| **Body bending** | | |
| Never | 7 (87.5) | 1 (12.5) |
| 1-2 times a month | 11 (52.40 | 10 (47.6) |
| 1-2 times a week | 16 (55.2) | 13 (44.8) |
| Everyday | 54 (85.7) | 9 (14.3) |
| $\chi 2$= 16.175*, $p$= 0.003, phi & Cramer's V = 0.366 | | |
| **Body twisting** | | |
| Never | 5 (50) | 5 (50) |
| 1-2 times a month | 15 (55.6) | 12 (44.4) |
| 1-2 times a week | 23 (67.6) | 11 (32.4) |
| Everyday | 41 (89.1) | 5 (10.9) |
| $\chi 2$= 12.286*, $p$= 0.031, phi & Cramer's V = 0.319 | | |
| **Neck twisting** | | |
| Never | 8 (50) | 8 (50) |
| 1-2 times a month | 18 (72) | 7 (28) |
| 1-2 times a week | 26 (68.4) | 12 (31.6) |
| Everyday | 36 (87.8) | 5 (12.2) |
| $\chi 2$= 10.708*, $p$= 0.013, phi & Cramer's V = 0.297 | | |
| **Prolonged standing** | | |
| Never | 2 (28.6) | 5 (71.4) |
| 1-2 times a month | 5 (55.6) | 4 (44.4) |
| 1-2 times a week | 10 (47.6) | 11 (52.4) |
| Everyday | 71 (84.5) | 13 (15.5) |
| $\chi 2$= 20.787*, $p$= <0.001, phi & Cramer's V = 0.414 | | |
| **Frequent walking** | | |
| Never | 1 (50) | 1 (50) |
| 1-2 times a month | 2 (28.6) | 5 (71.4) |
| 1-2 times a week | 8 (50) | 8 (50) |
| Everyday | 77 (80.2) | 19 (19.8) |
| $\chi 2$= 14.277*, $p$= 0.003, phi & Cramer's V = 0.344 | | |
| **Manual therapy techniques** | | |
| Never | 25 (58.1) | 18 (41.9) |
| 1-2 times a month | 8 (88.9) | 1 (11.1) |
| 1-2 times a week | 21 (72.4) | 8 (27.6) |
| Everyday | 34 (85) | 6 (15) |
| $\chi 2$= 8.837*, $p$= 0.033, phi & Cramer's V = 0.270 | | |

Chi-square analysis. *. Association is significant at the 0.05 level.

## DISCUSSION

Findings of this study found that the prevalence of MSS at any site among healthcare workers was high (95%). These results were similar with that of a previous study among 347 Iranian nurses in which the prevalence of musculoskeletal symptoms at any site of the body was also found to be 95% (13). This high prevalence of MSS among healthcare workers can be explained by high workloads, lack of rest and the nature of working environment that requires them to work at fast pace. Neck was the most prevalent body region suffering from MSS followed by low back and shoulder. These body regions involved in daily routine task of health care workers including neck twisting, manual handling, prolonged standing, and monotonous works. These results were comparable with those found in India in which the most frequent symptoms were reported in low back (45.7%), neck (28.5%) and shoulders (23.5%) (24). Most of the respondents aged less than 40 years old and 71.1% were female. The gender distribution is parallel with that of the national distribution among Malaysian healthcare workers. In the Hospital Kuala Lumpur (HKL), almost all the total nurses in Emergency and Trauma Department were females. Besides, high proportion of Malays work in public sector causing 66.1% of the respondents to be Malay (Woo, 2015). Almost all respondents (96.7%) were diploma or bachelor degree holders as those were the minimum requirements to work in healthcare sector. Most of them had normal BMI. This was probably because their work requires being physically active. The number of smokers were relatively low (4.1%) as smokers are generally more common among male than females and majority of healthcare workers were female. Our findings showed that the level of education and type of occupation were significantly associated with MSS. MSS was also found to be significantly associated with 14 body movements and work tasks, and psychosocial risk factor which was job insecurity. Most respondents with MSS had certificate and diploma, while respondents with bachelor and master's degree have no MSS. However, the result might be overestimated due to small number of respondents who were having Master degree and certificate that involved in this study.

Findings also indicated that there was no significant association between age, number of dependent, household income, BMI, gender, marital status, race, and smoking with MSS. The finding was quite different from previous study. In a study conducted among healthcare workers in Denizli, it was found that elder age, female, high BMI and being married had association with low back pain risk (10). Similarly, in Iran, musculoskeletal symptoms were found to be high among female nurses (13). Other than that, BMI of more than 25 and female was also found to reported higher prevalence of work-related injuries among Malaysian physiotherapist compared to those with BMI lower than 25 and male workers (2). This injury might be as the result of the symptoms. Similar to smoking and BMI, due to low number of smokers (4.1%) and that the distribution of BMI was not even in which majority respondents had normal BMI and only 27.3% were overweight and 14.9% obese, no significant association with MSS was found. Age was also found insignificant which is in contrast with several of previous studies (10,11). The current study has younger age distribution than the previous studies which might explain why the findings were not consistent with that of the previous studies.

Since occupation seem to show significant contribution to development of MSS. In this study, higher number of physiotherapists experienced MSS was comparable to doctors and nurses. These findings were supported by those of a previous study in Malaysia which indicated that the prevalence of MSS among physiotherapist is very high (71.6%) (7). According to Nordin et al. (7), this situation might be due to limited number of physiotherapists in public hospital. In fact, there were approximately only 100 physiotherapists working in HKL which cause unavoidable high clinical workload among them. Although the practice of physiotherapy in Malaysia public hospital had been equipped with ergonomically appropriate equipment by the Ministry of Health (MOH), there were still other factors including increased patient-to-therapist ratios and limited therapist-patient contact time that might place them at high risk of developing MSS. However, different findings were found in other countries. In a previous study in India (24), the highest prevalence was reported by nurses (55.5%).

For the body movements and work tasks, results of the current study showed that there were significant association between manual handling, lifting heavy load, change position of patient in bed, carry patient between bed and chair, monotonous work, prolonged standing, frequent walking, awkward postures, body bending, body twisting, neck twisting and manual therapy techniques. The findings were similar to study conducted among hospital nurses in rural Maharashtra, India that found strong association between working in same position for long time, bending, twisting, lifting and treating excessive number of patients with MSS (25). For psychosocial risk factors, high job insecurity was significantly (fair) correlated with more MSS (r=-0.302). Previous studies by Nella et al. (26) reported that job insecurity had been associated with physical health including increased morbidity, lower levels of self-reported health, increased incidence rates of hypertension, coronary heart disease, and myocardial death. It also leads to restricted physical activity due to musculoskeletal disorders such as low back pain and neck pain (26). Healthcare workers were exposed to stress that will affect the physical of a person. Some of the workers might experience job insecurity especially who were in probation period. When this happened, the one who in this period were tend to feel more exhausted

and had high tendency to develop MSS. No association were found between job strain and MSS. This finding was not coherent with that found in a previous study which found that workers that had job strain had association with MSS (27).

## CONCLUSION

In conclusion, the prevalence of MSS among respondents was as high as other developing country among healthcare workers. The risk factors that found to have significant association with MSS in this study were body movements and work tasks (lifting heavy load, carrying patient to and from the toilet, carrying load less than 10kg, change position of patient in bed, prolonged standing, frequent walking, awkward postures and neck twisting) and psychosocial risk factors (job insecurity). Findings may help in developing a more job specific guideline on MSDs in healthcare setting to create a healthy workplace and building ergonomic working condition.

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## REFERENCES

1. Department of Occupational Safety and Health. Occupational Diseases and Poisoning Investigation. 2018 [cited 2018 March 18]. Available from: http://www.dosh.gov.my/index.php/en/occupational-diseases-and-poisoning-statistic
2. Amin NA, Nordin R, Fatt QK, Noah RM, & Oxley J. Relationship between psychosocial risk factors and work-related musculoskeletal disorders among public hospital nurses in Malaysia. Annals of Occupational and Environmental Medicine. 2014;26(1): 1–9.
3. Dianat I, Bazazan A, Souraki Azad MA, & Salimi SS. Work-related physical, psychosocial and individual factors associated with musculoskeletal symptoms among surgeons: Implications for ergonomic interventions. Applied Ergonomics. 2018;67: 115–124.
4. Deros BM, Adilah M, & Daruis DDI. A Study on the Prevalence of Musculoskeletal Disorders among Health Care Workers at a Private Medical Centre. 2014 IEEE Conference on Biomedical Engineering and Sciences (IECBES). 2014; 403-407.
5. Anderson SP, & Oakman J. Allied Health Professionals and Work-Related Musculoskeletal Disorders: A Systematic Review. Safety and Health at Work. 2016;7(4):259–267.
6. Abdul Rahman H, Abdul-Mumin K, & Naing L. Psychosocial Work Stressors, Work Fatigue, and Musculoskeletal Disorders: Comparison between Emergency and Critical Care Nurses in Brunei Public Hospitals. Asian Nursing Research, 2017; 11(1): 13–18.
7. Nordin NAM, Leonard JH, & Thye NC. Work-related injuries among physiotherapists in public hospitals: a Southeast Asian picture. Clinics (Sro Paulo, Brazil). 2011; 66(3): 373–378.
8. Rahmah MA, Rozy J, Halim I, Jamsiah J, Shamsul AS. Prevalence of back pain among nurses working in Government Health Clinics and Hospital in Port Dickson, Malaysia Journal of Community Health. 2008; 14(2):11–18.
9. Anap D, Iye C & Rao K. Work related musculoskeletal disorders among hospital nurses in rural Maharashtra, India: a multi centre survey. International Journal of Research in Medical Sciences. 2013; 1(2):101.
10. Şimşek, Ş, Yağci N, & Şenol H. Prevalence and Risk Factors of Low Back Pain among Health-care Workers in Denizli. Ağrı - The Journal of The Turkish Society of Algology. 2017; 71–78.
11. Koehoorn M, Breslin FC, & Xu F. Investigating the Longer-Term Health Consequences of Work-Related Injuries Among Youth. Journal of Adolescent Health.2008;43(5): 466–473.
12. King P, Huddleston W, & Darragh AR. Work-related musculoskeletal disorders and injuries: Differences among older and younger occupational and physical therapists. Journal of Occupational Rehabilitation. 2009;19(3):274–283.
13. Mehrdad R, Dennerlein JT, Haghighat M, & Aminian O. Association Between Psychosocial Factors and Musculoskeletal Symptoms Among Iranian Nurses Association Between Psychosocial Factors and Musculoskeletal Symptoms Among Iranian Nurses. American Journal of Industrial Medicine. 2010; 53(10): 1032–1039.
14. Hoe VCW, Kelsall HL, Urquhart DM, & Sim MR. Risk factors for musculoskeletal symptoms of the neck or shoulder alone or neck and shoulder among hospital nurses. Occupational and Environmental Medicine.2012;69(3):198–204.
15. Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, & Amick B. The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessment of psychsocial job characteristics. Journal of Occupational Health Psychology.1998;3(4): 322–355.
16. Karasek, R, Choi B, Ostergren P, & Ferrario M. Comparative international reliability and validity study of JACE-Job Content Questionnaire (JCQ): European worker's psychosocial job characteristics. 2003 [cited 2018 March 20] Available from http://www.jcqcenter.org/FAQs.html

17. Kurşun Ş, Evirgen S, Akbulut N, Oztas B, & Vaizoglu SA. Work Characteristics and Musculoskeletal Disorders among Postgraduate Dental Students: A Pilot Study. Journal of Musculoskeletal Pain. 2014;22(1): 62–67
18. Rambabu T, & Suneetha K. Prevalence of work related musculoskeletal disorders among physicians, surgeons and dentists: A comparative study. Annals of Medical and Health Sciences Research.2014; 4(4):578–582.
19. Ribeiro T, Serranheira F, & Loureiro H. Work related musculoskeletal disorders in primary health care nurses. Applied Nursing Research.2017;33:72–77.
20. Wong T, Teo N, & Kyaw M. Prevalence and risk factors associated with low back pain among health care providers in a Kuwait hospital. Malaysian Orthopaedic Journal.2020; 4(2): 23–28.
21. Hospital Kuala Lumpur Official website. (2017). [cited 2018 April 2] Available from http://www.hkl.gov.my/index.php?option=com_content&view=article&id= 155
22. Lwanga, S K, & Lemeshow S. Sample size determination in health studies A practicle manual. 1991. World Health Organization.
23. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sωrensen F, Andersson G, & Jωrgensen K. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Applied Ergonomics.1987;18(3): 233–237.
24. Yasobant S, & Rajkumar P. Work-related musculoskeletal disorders among health care professionals: A cross-sectional assessment of risk factors in a tertiary hospital, India. Indian Journal of Occupational and Environmental Medicine. 2014;18(2):75.
25. Anap D, Iyer C, & Rao K. Work related musculoskeletal disorders among hospital nurses in rural Maharashtra, India: a multi centre survey. International Journal of Research in Medical Sciences. 2013;1(2): 101-107.
26. Nella D, Panagopoulou E, Galanis N, Montgomery A, & Benos A. Consequences of Job Insecurity on the Psychological and Physical Health of Greek Civil Servants. BioMed Research International. 2015; 2015:673623: 1-8
27. Schoenfisch AL, & Lipscomb HJ. Job characteristics and work organization factors associated with patient-handling injury among nursing personnel. Work. 2009; 33(1): 117–128.