ORIGINAL ARTICLE

Distribution of Musculoskeletal Symptoms and Ergonomic Risk Assessment Among Housekeepers at Budget Hotels in Sepang, Selangor

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ABSTRACT

Introduction: : Hotel housekeepers are exposed to various ergonomic risks and there is a need to assess the physical risk factors for the work tasks performed. This study aims to determine the distribution of musculoskeletal symptoms (MSS) and perform ergonomic risk assessment among hotel housekeepers working in budget hotels in District of Sepang, Selangor. **Methods:** A cross-sectional study was conducted among hotel housekeepers from 13 budget hotels around District of Sepang. Nordic questionnaire was used for the assessment of MSS. The overall risk level was determined by Workplace Ergonomic Risk Assessment (WERA) while Rapid Entire Body Assessment (REBA) was used to evaluate the whole body postural risks. Data obtained were entered into statistical program for further analysis according to objectives. **Results:** This study received 67.0% (n=40) response rate. In total, MSS was reported by 100% (n=40) of the participants in this study. Lower back is the most affected region (77.5%, n=31) and this was followed by heels (57.5, n=23) and shoulders (52.5%, n=21). WERA results showed that all housekeepers are found to be in medium action level of risk meanwhile REBA assessment reported scores that are categorised into medium, high and very high risk. This study suggests that there is the need for changes being implemented in daily work tasks performed. **Conclusion:** Hotel housekeepers were exposed to high body postural risk due to exposure to highly repetitive movements and awkward posture while performing work tasks. Effective ergonomic intervention is needed for prevention of debilitating musculoskeletal disorders besides to increase work productivity.

Keywords: Musculoskeletal disorder, Work-related musculoskeletal disease, Occupational risk factors, Ergonomic, Hospitality service

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INTRODUCTION

Occurrence of musculoskeletal symptoms (MSS) among the working population are commonly reported and usually involves symptoms such as pain and discomfort in the areas of the upper body such as the neck, shoulders, wrists and hands and the lower body such as the upper and lower back and feet and ankles (1). A research has reported that risk factors such as awkward postures, repetitive movements and forceful exertions are the most common physical factors found to be significantly linked to the development of musculoskeletal disease (2).

In Malaysia, the uptrend and expansion of tourism industry has led to the growth of many new small and large hotels throughout the country due to the increasing number of incoming tourist who seeks for accommodation services while on vacation or for any other purposes (3). In addition, in 2010, the number of workers employed in tourism and hospitality industry was recorded as the second biggest total employment after manufacturing sector, which was 12% due to booming tourism industry (4).

Hotel housekeepers are part of the main operating divisions in the organisation of any hotel and acts as the major player in the production of basic hotel's services which are rooms (5). Thus, they have a crucial role in ensuring quality of the service provided to the customers. Such role exposes them work tasks that linked to repetitive movement, excessive force, non-neutral and stationary postures and others identified as the causal factors of work-related musculoskeletal disorders (MSD) (6).

Specific work tasks related to hotel industry such as changing bedsheets, keeping rooms tidy and cleaning toilets are among the physically demanding tasks

performed by housekeepers as reported in a local study that involved 65 local housekeepers from 10 different hotels around Malaysia (7). In terms of international literature, a study conducted at a Finnish hotel reported that almost all hotel housekeepers experienced shoulder and back pain because of the heavy and repetitive work that need to be completed and this is compounded by the need to perform work tasks at a fast pace (8).

The Malaysian legal framework requires the reporting of diagnosed MSD at the workplace under Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease 2004 (9). Statistics are collected and reported by the Department of Occupational Safety and Health however the available data does not describe the reported cases according to the specific sectors such as the hotel industry in Malaysia. However, there was a previous study that reported low back pain (60%), wrists or hands (42%) and knees (37%) as the most affected body part in the last 12 months among the hotel housekeepers in Malaysia (7). Despite the distribution of MSS, no data regarding their exposure to ergonomic risk factors associated with their daily tasks were reported in the previous study. Bhattacharya (10) believed that higher prevalence of MSDs among employees led to decrease of the productivity and increase of loss workdays. In the long run, MSD can bring permanent detrimental effects on the workers if no prevention and control methods are being developed to protect this subgroup of working populations.

Budget hotels are increasing in numbers in urban areas in Malaysia (11). Rooms in a budget hotel are cheaply priced and contains basic facilities for a large cross-section of customers. Budget hotels are usually small and are commonly family-run, as such the number of workers including housekeepers are relatively small. Within such settings, the housekeepers may have to also perform other work tasks related to hotel activities which may expose them further to more ergonomic risks. In addition, the work done usually involves more manual handling and may have added physical demands due to the use of manual tools, as opposed to large chain hotels, which are more technologically equipped. However, no study has been done locally among housekeepers in such local settings.

This study aims to determine the prevalence of MSS and to perform objective measurements of ergonomic risks associated with housekeeping work tasks. Data obtained from the study can help to address the current MSS problems among the workers in order to make an estimation of the health impacts to the individual and how it affects their daily performance in addition to help provide recommendations to protect the workers.

MATERIALS AND METHODS

Study design and setting

This was a cross-sectional study that was conducted among hotel housekeepers that are employed in budget hotels across the Sepang District, Selangor. Data collection was performed starting from January until April 2018. Sepang was selected because the district has become the favorite area for travelers who need to transit for a short or longer stay since Kuala Lumpur International Airport (KLIA) and KLIA2 are situated at this district. Besides, this district also has few tourist attractions area such as the Bagan Lalang beach and the Sepang International Racing Circuit. The management of all operating budget hotels listed in various hotel reservation websites across the Sepang area was contacted and invited to take part in this study. A total of 13 budget hotels management agreed to take part in this study.

This study recruited housekeepers according to the following inclusion criteria; they were Malaysians, were employed for minimum of one year and aged between 18 to 60 years old. Pregnant women, people whom any health practitioner diagnosed with heart disease and those who had undergo any musculoskeletal surgery were excluded from this study. Essentially, all employed housekeepers in each of the hotel were invited to take part in this study and a purposive sampling method was used. A total of 40 housekeepers consented to participate in this study and were recruited.

Among the tools used in this study is a set of Malay-translated questionnaire that consist of several parts. Part A of the questionnaire consisted of items on socio-demographic background, general occupational traits, lifestyle and medical history while Part B consisted items from the standardized Nordic Musculoskeletal Symptoms questionnaire by Kuorinka et al. (12). Interview-based questionnaire was the method used to collect data. The Nordic questionnaire was used to obtain information about the symptoms at 9 body parts which includes neck, shoulder upper and lower back areas, elbows, hand/wrists, waist/thighs, knees and ankle/legs regions for the past 12 months. The standard questionnaire was back-to-back translated from English to Malay in order to ensure there are no changes to the actual questionnaire originally provided in English.

Workplace Ergonomic Risk Assessment (WERA)

Next, Workplace Ergonomic Risk Assessment (WERA) worksheet was used as the observational tool to identify physical risk factor exposures that associated with Work-related MSDs (13). WERA consist of physical risk factors linked with ergonomic hazard which were

posture, repetition, forceful, vibration, contact stress and task duration and involving shoulder, wrist, back, neck and leg. WERA uses a scoring system and comes up with action levels that are used to determine the risk level and if there is the need for action to conduct more detailed assessment. Recorded videos of housekeepers performing work tasks were used to assist observation by the researcher.

Rapid Entire Body Assessment (REBA)

Rapid Entire Body Assessment (REBA) worksheets were used to evaluate the whole-body postural risks associated with the work tasks as the study instrumentation for this study (14). The video recorded and picture taken were used during risk evaluation of the work tasks.

Statistical analysis

The statistical analysis was performed by using Statistical Package for the Social Sciences (SPSS) version 22. For this study, descriptive analysis performed to determine the distribution of the socio-demographic, prevalence of musculoskeletal symptoms and work-related characteristics of the respondents. WERA and REBA analysis were scored by only one researcher and the results were cross-checked by an ergonomic expert at the Department of Environmental and Occupational Health, Universiti Putra Malaysia. Results of the ergonomic assessment will be explained according to its given categorisation.

Validity of Questionnaire

Pre-testing for the questionnaire was conducted on 10% (n=6) of respondents from the total sample size to ensure the validity of the questionnaire. It involved workers with the same characteristics from the same sector that was not included as the actual respondents. Any terms that were found to be ambiguous from the pre-testing of the questionnaire was amended so that the respondents will have a better understanding of the questions.

Reliability of Questionnaire

In this study, data from pre-testing which involved 6 respondents with similar characteristics of the actual respondents were keyed-in into the SPSS. Cronbach's alpha test using SPSS was performed to the data entered and reliability of the questionnaire obtained was 0.71, which is nearly similar to the reliability obtained in a previous study (15).

Ethical Consideration

The ethical clearance has obtained from Research Ethics Committee (JKEUPM) of Universiti Putra Malaysia with the referral number was (JKEUPM-2017-207).

RESULTS

This study obtained a response rate of 66.7% (n=40). All the respondents that participated in this study was Malaysian and comprised of 19 males and 21 females from 13 budget hotels located in District of Sepang. There was an average of 3 housekeepers employed at each of the budget hotel.

Socio-demographic characteristics

The respondents had mean (Standard Deviation; SD) age of 32.8 (11.2) years old. Next, the mean (SD) BMI of the respondents was 24.8 (5.3). From this study, almost all the respondents were right-handed meanwhile only 7.5% (n=3) of them were left-handed. For smoking status, 20.0% (n=8) of the respondents were current smokers. In addition, none of the respondents have heart problem, have undergone any surgical procedures and for the female respondents, none of them were pregnant during the study period. Besides that, more than half of the respondents in this study were not involved in any physical activities during their leisure times. Table I presents the data obtained for the socio-demographic distribution of the respondents.

Table I : Frequency distribution of socio-demographic characteristics of hotel housekeepers (n=40) in 13 budget hotels at District of Sepang

Variables		n (%)	Mean (±SD)
Age (Years)	18-30	20 (50.0)	32.8 (±11.2)
	31-40	11 (27.5)	
	≥41	9 (22.5)	
Gender	Male	19 (47.5)	
	Female	21 (52.5)	
Ethnicity	Malay	27 (67.5)	
	Chinese	1 (2.5)	
	Indian	6 (15.0)	
	Others	6 (15.0)	
BMI	Underweight	1 (2.5)	24.8 (±5.3)
	Normal	23 (57.5)	
	Overweight	12 (30.0)	
	Obese	4 (10.0)	
Hand dominance	Right-handed	37 (92.5)	
	Left-handed	3 (7.5)	
Smoking	No	32 (80.0)	
	Yes	8 (20.0)	
Physical activity	No	19 (47.5)	
	once a week	7 (17.5)	
	twice a week	4 (10.0)	
	>thrice a week	10 (25.0)	

n=frequency, SD=standard deviation

Occupational information of hotel housekeepers

This study found that 55.0% (n=22) of the respondents who participated in this study had previous working history. About 40.9% (n=9) of the total respondents had

previous working experience in the hotel industry and food and beverage sector. Only one respondent had history of injury at the previous workplace.

The respondents worked as hotel housekeepers and all of them were involved in several work tasks such as making beds, tidying room area, wiping furniture, vacuuming, cleaning the bathroom and disposing rubbish and waste while 17.5% (n=7) of the respondents notes that they are also involved in other tasks such as supervising, act as housekeeping runner and doing the laundry.

Next, there were 85.0% (n=34) of the respondents who have less than 6 years of experience working as hotel housekeepers. More than half of total respondents were involved in shift work schedule meanwhile 18 (45.0%) of them does not do overtime work. This study also points out that 62.5% (n=25) of the respondents have more than 48 hours of work time per week.

As addition, this study also reports that 22 of the respondents that participate in the study have undergone job training regarding safe working procedures. On the other hand, it was discovered that more than half of the respondents practice at least 1 to 3 safe working procedures while performing the work tasks. The safe working procedures include best practices in performing tasks such as lifting loads, making beds, pushing trolley, emptying trash can, cleaning high area and using vacuum. Table II presents the data of occupational information obtained from the 40 respondents.

Distribution of one-year prevalence of MSS among hotel housekeepers

The results of self-reported MSS among the hotel housekeepers were based on the modified Nordic questionnaires. In total, the prevalence of the overall MSS among the hotel housekeepers was 100.0% (n=40). They report a minimum of one discomfort or pain at any parts of the body. The results of this study indicates that 27.5% (n=11) of housekeepers have symptoms at only one body region while 42.5% (n=17) and 30% (n=12) of the hotel housekeepers were found to have pain at 2 to 5 parts and more than 5 parts of the body regions respectively. This study also identify that three most affected body parts are lower back (77.5%, n=31), followed by heels (57.5%, n=23) and shoulder (52.5, n=21). In terms of the least reported symptoms, elbow was found as the part of the body that was least affected (10.0%, n=4). Table III shows the distribution of MSS at body parts.

Evaluation of WERA for each physical risk factors and the action level

A total of 40 workers were involved in the Workplace Ergonomic Risk Assessment (WERA) worksheet activity. The scores were considered based on the 1) posture, 2) repetition, 3) amount of load lifted, 4) use of vibration tool, 5) use of handle or wearing hand gloves and also 6) the task hours per day. From the evaluation, the back area was found to have the highest ergonomic exposure compared to others with the mean (SD) score of 5.13 (0.52) whilst the hotels housekeepers was least exposed to vibration with the mean (SD) score of 3.08 (0.27). Table IV shows the results of the mean score obtained for each physical risk factor that was evaluated based on the WERA worksheet.

Table II : Frequency distribution of work-related characteristics of hotel housekeepers (n=40) in 13 budget hotels at District of Sepang

Variables		n (%)	Mean (±SD)
Previous work	No	18 (45.0)	
	Yes	22 (55.0)	
Injury [a]	No	21 (95.0)	
	Yes	1 (4.5)	
Current work task	Making beds	40 (100)	
	Tidying room area	40 (100)	
	Wiping furniture	40 (100)	
	Vacuuming	40 (100)	
	Cleaning bathroom	40 (100)	
	Emptying trash can	40 (100)	
	Mopping floors	40 (100)	
	Other tasks		
	Supervising	4 (10.0)	
	Housekeeping runner	2 (5.0)	
	Laundry	1 (2.5)	
Years of working	1 - 5	34 (85.0)	3.3 (3.62)
	≥6	6 (15.0)	
Shift work	No	16 (40.0)	
	Yes	24 (60.0)	
Weekly working hours	≤48	15 (37.5)	
	>48	25 (62.5)	
Overtime	No	18 (45.0)	
	Yes	22 (55.0)	
Job training	No	18 (45.0)	
	Yes	22 (55.0)	
Practice of safe work procedures	No practice	-	
	1 – 3 practices	25 (62.5)	
	4 – 6 practices	15 (37.5)	

n=frequency, SD=standard deviation, [a]n= 22, for respondents with previous working history

After performing the analysis based on WERA checklist, the final scores and the action level were obtained. All the respondents (n=40) had risk levels that is within the category of medium risk where the tasks performed needs to be further investigated and requires change such as the use of assistive tools. The final scores for WERA ranged in between 28 to 44 in which the tasks needed to be further investigated and changes are necessary.

Table III : Distribution of MSS at body parts obtained through Nordic Questionnaire among hotel housekeepers (n=40) in 13 budget hotels at District of Sepang

Body regions	Prevalence % (n)
Lower back	77.5 (31)
Heels	57.5 (23)
Shoulders	52.5 (21)
Hand/wrist	50.0 (20)
Upper back	47.5 (19)
Neck	37.5 (15)
Knees	27.5 (11)
Thighs	22.5 (9)
Elbow	10.0 (4)

n=frequency

Table IV : Score of WERA for each physical risk factor among hotel housekeepers (n=40) in 13 budget hotels at District of Sepang

Physical Risk Factors	Score	
	Mean**	(±SD)
Shoulder(1)*	4.13	0.40
Wrist(1)*	5.00	0
Back(1)*	5.13	0.52
Neck(1)*	3.68	0.62
Leg(2)*	5.05	0.71
Force(3)*	3.80	0.91
Vibration(4)*	3.08	0.27
Contact stress(5)*	5.00	0
Task duration(6)*	4.33	0.86

**MEAN OF SCORE FOR EACH PHYSICAL RISK FACTOR, *(1) POSTURE AND REPETITION, (2) POSTURE, (3) LIFTING THE LOAD, (4) USE OF VIBRATION TOOL, (5) USE OF TOOL HANDLE OR WEARING HAND GLOVES, (6) TASK-HOUR/DAY, SD=STANDARD DEVIATION

REBA scores for body postural risk

Based on WERA final scores and action level identified, rapid entire body assessment (REBA) was conducted for all respondents in order to investigate the body postural risk level and its association with each specific work tasks performed by the hotel housekeepers. The results of the REBA scores were found to be in medium, high and very high category. The distributions of the REBA scores were tabulated in Table V.

DISCUSSION

This study was done among hotel housekeepers of Malaysian nationality working in 13 budget hotels located in district of Sepang. This study assessed ergonomic risk factors and body postural risks by using video recording as the observation aid tool. It is common for budget hotels to employ only a small number of staffs and when potential participants did not meet inclusion criteria or decline to be included in this study, we were not able to identify additional number of housekeepers to be invited. The low response rate from our initial aim of 60 could not be achieved within this small scope of study.

Table V : Distribution of body postural risks among the hotel housekeepers (n=40) in 13 budget hotels at District of Sepang

Type of work	Postural body risk (REBA Scores)									
	Negligible risk (1)		Low risk (2-3)		Medium risk (4-7)		High risk (8-10)		Very high Risk (>10)	
	n	%	n	%	n	%	n	%	n	%
Making beds	-	-	-	-	-	-	-	-	40	100
Tidying room area	-	-	-	-	24	60	14	35	2	5.0
Wiping furniture	-	-	-	-	20	50	11	27	9	22.5
Vacuuming	-	-	-	-	20	50	14	35	6	15
Cleaning bathroom	-	-	-	-	-	-	-	-	40	100
Emptying trash can	-	-	-	-	40	100	-	-	-	-
Mopping floors	-	-	-	-	39	97	1	2.5	-	-

n=frequency

Issue regarding MSD among workers needs to be acknowledged by employers and employees to enable efficient control methods to be implemented. All parties need to be aware that MSD problem in the workplace can lead to increase absenteeism besides lowering productivity of the workers (16).

Distribution of 12-month prevalence of MSS among hotel housekeepers

From this study, the 12-month prevalence of MSS recorded was high (100.0%) as compared to other previous study, where there was a 25.0% prevalence of MSD reported in the study conducted in Gujarat among 50 housekeepers (17). The study concluded that MSD among this population was moderately high. Another study conducted among 905 hotel restaurant workers in Taiwan found that there was 85.0% work-related MSS prevalence among the study participants (18). When compared to the present study, differences between the findings may partly be explained by the type of questionnaire used to collect data in which the present study used the modified Nordic questionnaire while the previous study mentioned above use self-structured interview methods to obtain information about MSS. Due to the use of different scales for measurement and the use of non-standardized tools produced varied measures and difficulties arise when comparing results from various studies. The initial aim of developing Nordic questionnaire in the assessment of MSS was to tackle these difficulties (19).

The highest prevalence of MSS reported in this study is at the lower back region. About 77.5% (n=31) of the housekeepers complained about having lower back pain. A local previous study also reported that lower back pain as the most common MSS problem among Malaysian housekeepers in which about two-third of them reported the symptom (7). Similarly, another previous study in India recorded lower back pain as the highest occurrence of MSS with 60.0% of prevalence among hotels housekeepers compared to other body part (17). The possible reason why lower back was the most frequently reported symptoms may have to do with the work tasks that housekeepers were involved in. From this recent study, hotel housekeepers are found to involve with work tasks such as making beds which force them to bend their back forward for more than 60˚. This posture is repeated for the entire working hours as they performed the specified work tasks. From the observation, the housekeepers will bend their back while tucking the bed covers under the heavy mattress at the four corners. The housekeepers also pull the mattress away from the headboard to put the new bed covers while maintaining their body in the bending forward position. The mechanism of the bending hazard is linked to the pressures on the intervertebral discs that depends on changes of the back-region position. The pressure can increase from 20-100% when a person bends forward up to 20˚-40˚ compared to while a person maintains in a standing position and the pressure is further intensified if work tasks involved load lifting (20).

The results of this study indicate that MSS reported at the heels is the second highest prevalence reported (n=23, 57.5%). This outcome is contrary to the findings of Rahman & Jaafar (21) who found that MSS involving foot or ankle has the lowest prevalence among male and female housekeepers (3.0%). A possible explanation for this is that the housekeepers were involved in manual handling tasks that needs to be done while standing beside often walking throughout the premises and at certain point they also carried some loads with them. The reason for this may be linked with overuse of tendon muscles at the foot or ankle region due to their work routine (22).

The third most affected body part for this study is the shoulder areas with reported prevalence of 52.5% (n=21). This prevalence comprises of 12.5% (n=5) of pain at the right side and 40.0% (n=16) of pain at both side of the shoulders. The pain experienced by the housekeepers is relevant with the process of work that they are involved in. For instance, the housekeepers had to flick the bed covers as the want to spread it on the mattress while doing the beds. By doing this, the upper arm is flexed for about 45 to 60˚ and the shoulder is raised. As addition, to scrub the higher area of the bathroom walls during the cleaning of bathrooms will requires the housekeeper to raise the shoulder and put the upper arm in the hanging position for a period. Other study has also demonstrated that approximately 50.0% of Latina housekeepers reported pain at the shoulder areas (23).

Evaluation of body postural risk

From the WERA analysis, it was concluded that the work tasks carried out by the housekeepers exposes them to awkward working postures and repetitive movements. A study in Finland has stated that repetitive and monotonous work and awkward postures while performing work tasks are precursor for one-third of reported MSD cases (24).

There is a finding from a study that points out that hotel housekeepers are expected to work with 8,000 different body postures for the daily shift while doing the room make up which is demand as a physically strenuous job that can lead to overuse of the muscle (25). This study however did not include such assessment as one of its aims. However, from the work observation done, it was found that the different body posture movements required to complete all their 6-8 tasks in a day's work varies. This is made worse with the use of manual tools such as vacuums, mops and scrubbing brush.

From the evaluation of REBA, the scores obtained for each of the work tasks such as making beds, tidying room area, wiping furniture, vacuuming, cleaning bathroom, emptying trash can and mopping floors demonstrate that these activities falls into high risks and there is necessary action needed for improvement. When the risk level ranges from medium to very high, it is necessary for actions to be done regarding the work task whether very soon or immediate changes (14).

There is, therefore, a definite need for improvements in work tasks that can be considered such as using fitted bed covers instead of the recent one. This may reduce the time for the housekeepers to make the beds. Other than that, the use of brushes with long handles to clean bathrooms can help in reducing the need for reaching and bending. Regular maintenance of the tools and equipment a way that can be adopted to ensure the equipment such as the vacuum cleaners and cart can work at the full potential. Taken together, these improvements can ease the process to conduct the work tasks thus shorten the duration of exposure to ergonomic risk factors.

The generalizability of these results is subject to certain limitations. For instance, this study is limited to hotel housekeepers from the budget hotels only. Small hotels adopt different management structure when compared to larger hotels that means responsibilities and work tasks delegations will be in some way different due to the number of available workforces (26). These budget hotels have small number of workers. However, budget hotels operating in Malaysia do have to have adequate number of staffs in accordance with the rooms or size

of the hotel. This requirement is specified under the Orchid rating system which sets minimum requirements for crucial elements such as cleanliness and hygiene standard, building safety and security, facilities and services, bedroom and staff requirements. The Orchid rating for tourist accommodation were introduced by the Ministry of Tourism, Arts and Culture, Malaysia to set a standard that hotels could adhere to (27).

CONCLUSION

This study has identified that hotel housekeepers are population at risk of getting work related MSDs with high body postural risk due to exposure to highly repetitive movements and awkward. One of the major findings from this study is 100% of the hotel housekeepers were experiencing MSS. The findings of this study also conclude that all the housekeepers are in the medium risk level for physical risk factors that requires further investigation and change in the work task. The management could adopt the usage of assistive devices and tools that ergonomically designed for human use to reduce the MSS prevalence reported. Additionally, providing training and refresher courses focusing on ergonomic risk to the housekeepers are necessary so that they can perform their job in an improved method thus increasing productivity. Moreover, workers should be trained on how to properly lift and move items, and how to decrease awkward movements and bending to reduce the prevalence of MSD. Future research could possibly explore the non-work related risk factors besides incorporating psychosocial risk factors that may contribute to developments of MSS in this field.

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REFERENCES

1. Meo SA, Alsaaran ZF, Alshehri MK, Khashougji M, Almeterk AAZ, et al. Work-Related musculoskeletal symptoms among building construction workers in Riyadh, Saudi Arabia. Pak J Med Sci. 2013;29(6):1394
2. Gerr F, Fethke NB, Anton D, Merlino L, Rosecrance J, Marcus M, et al. A prospective study of musculoskeletal outcomes among manufacturing workers: ii. effects of psychosocial stress and work organization factors. Hum Factors. 2014;56(1):178-90.
3. Sahida W, Rahman SA, Awang K, Man YC. The implementation of shariah compliance concept hotel: De Palma Hotel Ampang, Malaysia. In 2nd International Conference on Humanities, Historical and Social Sciences. 2011;17:138-42).
4. Sultan NHH. Stereotaip gender dan pekerjaan wanita dalam sektor perhotelan di Pulau Langkawi, Kedah. Pulau Pinang: Universiti Sains Malaysia; 2015.
5. Rutherford DG, O'Fallon MJ. Hotel management and operations.4th ed. New Jersey: John Wiley and Sons; 2007.
6. Lee J, Lee J, Mun H, Lee KJ, Kim J. The relationship between musculoskeletal symptoms and work-related risk factors in hotel workers. Ann Occup Environ Med. 2013;25(1):20-5.
7. Rahman MNA, Jaffar MSM, Hassan MF, Ngali MZ, Pauline O. Exposure level of ergonomic risk factors in hotel industries. IOP Conf Ser Mater Sci Eng. 2017;226(1):012018.
8. Lundberg H, Karlsson JC. Under the clean surface: working as a hotel attendant. Work Employ Soc. 2011;25(1):141-8.
9. Occupational Safety and Health Act 514 (Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease) Regulations, 2004.
10. Bhattacharya A. Costs of occupational musculoskeletal disorders (MSDs) in the United States. Int J Ind Ergon. 2014;44(3):448-54.
11. Albattat AR, Ibrahim R, Raof RA, Nasruddin NA, So'od YSM. The characteristics of guest needs in budget hotel section 13, Shah Alam, Selangor. 7th International Academic Consortium for Sustainable Cities Prosperous Urban Living Conference at Universiti Sains Malaysia, Pulau Pinang. 2016.
12. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987;18(3):233-7.
13. Rahman MNA, MRA Rani, MJ Rohani. WERA: An Observational Tool Develop to Assess the Physical Risk Factor associated with WRMDs. J Hum Ergology. 2011;40(2):19-36.
14. Hignett S, L McAtamney. Rapid entire body assessment (REBA). Appl Ergon. 2000; 31(2):201-5.
15. Hani NH, Zainal Abidin E, Ya'acob NA, Karuppiah K, Rasdi I. Musculoskeletal symptoms, risk factors and postural risk analysis of pineapple plantation workers in Johor. J Occ Saf Health. 2016;13(1):17-26.
16. Buckle P. Ergonomics and musculoskeletal disorders: overview. Occup Med. 2005;55(3):164-7.
17. Parmar S, Dalal P. A study of musculoskeletal disorder among housekeeping staff in hotel industry. Int J Home Sci. 2017;3(3):83-85.
18. Chyuan JYA, Du CL, Yeh WY, Li CY. Musculoskeletal disorders in hotel restaurant workers. Occup Med. 2004;54(1):55-7.
19. López-Aragón L, López-Liria R, Callejón-Ferre

ángel J, Gómez-Galán M. Applications of the standardized nordic questionnaire: a review. Sustainability. 2017;9(9):1–42.
20. Pourahmadi MR, Takamjani IE, Jaberzadeh S. The effect of core stabilization exercise on the kinematics and joint coordination of the lumbar spine and hip during sit-to-stand and stand-to-sit in patients with chronic nonspecific low back pain (coscious): study protocol for a randomized double-blind controlled trial. JMIR Res Protoc. 2017;6(6):109.
21. Rahman MNA, Jaffar MSM. Musculoskeletal symptoms and ergonomic hazards among room attendants in hotel industries. Malays J Hum Factors Ergon. 2017;1(2):25-34.
22. Canoso JJ. Heel pain: diagnosis and treatment, step by step. Clev Clin J Med. 2006;73(5):465-9.
23. Hsieh YC, Apostolopoulos Y, Sönmez S. Work conditions and health and well-being of Latina hotel housekeepers. J Immigr Minor Health. 2016;18(3):568-1.
24. Piedrahita H. Costs of work-related musculoskeletal disorders (MSDs) in developing countries: Colombia case. Int J Occup Saf Ergon. 2006;12(4):379-86.
25. Liladrie S. 'Do not disturb/please clean room': hotel housekeepers in Greater Toronto. Race Cl. 2010;52(1):57-69.
26. Ingram D. Organizational and structural differences between small and large businesses. 2018. Retrieved from http://smallbusiness.chron.com/organizational-structural-differences-between-small-large-busi- nesses-10678.html
27. Ministry of Tourism and Culture Malaysia. Tourist accommodation premises. 2020. Retrieved from http://www.motac.gov.my/en/services/registration/tourist-accommodation-premises/category/37-premis-penginapan-pelancong