RISK FACTORS OF MUSCULOSKELETAL DISORDERS AMONG SUPERMARKET WORKERS IN KAJANG

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ABSTRACT

Musculoskeletal disorders (MSDs) are injuries which affect the movement of musculoskeletal system of the human body and supermarket workers are prone to develop MSDs due to their tasks by handling material manually. The objectives of this study were to assess the risk factors of MSDs including propose appropriate control measures towards risk reduction. This study was conducted by using Cornell Musculoskeletal Questionnaire as a survey and Rapid Entire Body Assessment (REBA) as an observation method. Among 14 respondents consisted of 12 males and 2 females, the self-reported questionnaires revealed that the most-troubled body part experienced by the respondents in the last one week was shoulder (64.29%), followed by feet (57.14%) and lower back (57.14%). For the REBA score, workers from fresh market department and grocery department reported to had medium risk level of awkward posture. In general, most supermarket workers were had to stand and use their upper limbs while conducting the tasks. Intervention in terms of administrative controls such as to change the way of people work and job rotation could minimize the risk of developing MSDs among supermarket workers

KEYWORDS: Musculoskeletal disorders; supermarket workers; Kajang; Rapid Entire Body Assessment

INTRODUCTION

Musculoskeletal disorders (MSDs) were mainly caused by ergonomic factors, individual factors, and psychosocial factors. However, the most prominent work-related musculoskeletal disorders originated from heavy workload coupled with ergonomic risks that leads to muscle stress and tension which causing an individual to experience pain. Imbalance between working condition and time for recovery will increase absenteeism among employees, eventually increase the risk of injury as well as compensation cost for the employers. According to annual reports by Social Security Organization (SOCSO), the number of cases of musculoskeletal injuries caused by work activities/work environment in 2016 and 2017 were 1,006 cases and 1,354 cases, respectively. While work-related musculoskeletal disorders affect almost workplace industries, meanwhile grocery work

ranked amongst in the top 25 professions in injuries such as neck, wrist tendonitis, rotator cuff syndrome and back pain (Silverstein and Adams, 2007). Most supermarket workers are still working in a conventional way which are stocking merchandises, lifting and pushing carts, packing fresh products, baking, cashiering and bagging. These tasks require workers to stand and use their upper limbs manually to conduct their specific routine. Nevertheless, the risks of MSDs among supermarket can be minimize when investigation is carried out annually to eliminate the hazard as well as to propose appropriate control measures.

RESEARCH METHOD

This research was designed as a cross-sectional study and the sample population was collected in Kajang, Selangor, Malaysia. Using the formula by Daniel (1999) to calculate the sample size, with confidence level of 95%, prevalence of MSDs among grocery workers of 78% (Anton & Weeks, 2016), and considering 80% response rate, the minimum sample size was 55 respondents. Supermarket workers in Kajang, Selangor who aged 18 years old and above without non-work related musculoskeletal injuries took part in this research. There were two parts of methods used in this study, the first was Initial Ergonomic Risk Assessment (ERA) and Advanced ERA. The Initial ERA was a survey which comprised of three sections: (1) Demographic, (2) Working conditions and (3) Cornell Musculoskeletal Questionnaires. The Cornell questionnaires was a self-reported questionnaires to identify the occurrence of pain and discomfort experienced by respondents in 12 anatomical body region like neck, lower back, foot, etc. This survey also could investigate whether the level of discomfort, its frequency and interference with respondent's working abilities.

Meanwhile the Advanced ERA was an observation assessment using Rapid Entire Body Assessment or REBA as a tool (McAtamney & Hignett, 2004). REBA worksheet had 2 sections, whereby section A covers neck, trunk and leg while Section B covers the arm and wrist. The assessor will determine the score to the following work activity done by employee. After the REBA assessment, a final REBA score will dictate whether it falls under low, medium or high risk level of MSDs. A recommended changes and control measures will be applied based on the identified risk level.

The data in this research were analysed using IBM Statistical Package of Social Sciences (SPSS) Version 23. Descriptive analysis such as frequency, percentage, mean including Chi Square test was applied to assess the association between demographic characteristics and musculoskeletal symptoms. P-value of 0.05 or less than that was considered as statistically significant.

RESULT AND DISCUSSION

The total number of respondents that was managed to be approached was 20 workers and the data were collected at one supermarket store in Kajang. 80% of the were supermarket workers given consent and participated in this research. However, only 14 respondents were chosen as some of the respondents have non-work related musculoskeletal injuries.

Initial Ergonomic Risk Assessment

Based on the Table 1.1, majority of the respondents were aged 25 years old and below with the mean of 25.86 (SD=6.76). Male workers dominated this industry with 81.25% while Indian race was the least among workers with a percentage of 14.3%. The mean height was 168.93 cm (SD= 9.83) and the mean weight for supermarket workers were 70.93 kg (SD= 17.72). Only three out of fourteen participants had a normal BMI while the

others had abnormal BMI range (underweight, overweight and obese). 57.1% of the supermarket workers were smoker while 42.9% were non-smokers.

Table 1.1 Demographic information among supermarket workers

Variable	N (%)	Mean (SD)
Age		25.86 (6.76)
≤ 25 years old	8 (57.1)	
≥ 26 years old	6 (42.9)	
Gender		
Male	12 (81.25)	
Female	2 (18.75)	
Height		168.93 (9.83)
Weight		70.93 (17.42)
BMI		24.79 (5.52)
Underweight	3 (21.43)	
Normal	3 (21.43)	
Overweight	5 (35.71)	
Obese	3 (21.43)	
Race		
Malay	12 (85.7)	
Indian	2 (14.3)	
Education level		
Secondary education	13 (92.9)	
Tertiary education	1 (7.1)	
Marital Status		
Single	11 (78.6)	
Married	3 (21.4)	
Smoking Status		
Smoker	8 (57.1)	
Non-smoker	6 (42.9)	

In a normal supermarket setting, the largest department was grocery department with 35.71% of respondents, followed by fresh market, café and receiving departments which had the same percentage of 14.29% as illustrated in Table 1.2. All of the respondents worked as a full-time workers, with 71.4% worked for 8 hours while 28.6% worked more than 8 hours in a day. Majority of the workers were working 2-5 person in one shift with a percentage of 64.29%.

Table 1.2 Working conditions among supermarket worker

Variable	Frequency (N=14)	Percentage (%)
Department		
Cafe	2	14.29
Grocery	5	35.71
Fresh market	2	14.29
Receiving	2	14.29
Front End	1	7.14
Operation	1	7.14
Security	1	7.14

Position		
Assistant Department Head	2	14.29
Cashier	1	7.14
Department Head	2	14.29
Division Manager	1	7.14
Sales Assistant	3	21.43
Store manager	1	7.14
Supervisor	4	28.57
Work schedule		
Full-time	14	100
Total number of working hours		
8 hours	10	71.4
More than 8 hours	4	28.6
Number of work breaks		
Once	14	100
Break duration		
1 hour	14	100
Number of people working together		
Alone	3	21.43
2-5 person	9	64.29
6-10 person	1	7.14
More than 10 people	1	7.14

According to the Table 1.3, it showed that the most troubled body part among workers in the last work week was shoulders with a percentage of 61.29% out of total workers experienced discomfort, with 1 person reported to had pain at shoulders once in a single day. The second most-troubled body region were foot whereby 11 out of 14 workers had pain in the last work week. Among the 11 person, 5 of them had pain on their foot occurred three to four times in the last work week. Meanwhile the third most-troubled body part was lower back with 57.1% of the respondents suffered from pain in the last work week. The current findings also displayed that 1 person had lower back pain for at least three to four times in the last week. The current study showed similarity with previous study by Balogh et al. (2016), reported that shoulders were the most troubled body part in the last 7 days suffered by workers. Compared to other study by Rahman & Zuhaidi (2017) and Forcier et al. (2008), showed that lower back pain to be the most prevalent among workers while current findings reported that lower back was the third most-troubled body region. The current study also supported by Anton & Weeks (2016), revealed that most workers had reported musculoskeletal symptoms in lower back and foot. The differences in self-reported results could be due to the difference in grocery tasks and depends on the workers experience working in the grocery industry.

Table 1.3 Self-reported pain/discomfort in the last work week among workers

Body region	Pain/discomfort in the last work week			
	Never N (%)	1-2 times last week N (%)	3-4 times last week N (%)	Once everyday N (%)
Neck	9 (64.3)	5 (35.7)	-	-
Shoulder	5 (35.71)			
Right		2 (14.29)		
Left			-	
Both		6 (42.86)		1 (7.14)
Upper back	6 (42.9)	8 (57.1)	-	-
Upper arm	10 (71.43)			
Right		1 (7.14)		
Left				-
Both			3 (21.43)	
Lower back	6 (42.9)	7 (50.0)	1 (7.1)	-
Forearm	13 (92.86)			
Right				
Left			-	-
Both		1 (7.14)		
Wrist	9 (64.29)			
Right		1 (7.14)		
Left		1 (7.14)	-	-
Both		3 (21.43)		
Hip/buttocks	11 (78.6)	3 (21.4)	-	-
Thigh	10 (71.43)			
Right		1 (7.14)		
Left			-	-
Both		3 (21.43)		
Knee	10 (71.4)			
Right				
Left		1 (7.14)	-	-
Both		3 (21.43)		
Lower leg	9 (64.3)			
Right				
Left			-	-
Both		5 (35.7)		
Foot	6 (42.86)			
Right			1 (7.14)	
Left			1 (7.14)	-
Both		3 (21.43)	3 (21.43)	

Based on Table 1.4, only two out of fourteen respondents reported to have no musculoskeletal symptoms in any body region. 6 respondents aged 26 years old and above experienced musculoskeletal symptoms while 2 out of 8 respondents aged 25 years old and below have to symptoms. 9 out of 14 respondents have abnormal BMI and reported to have symptoms, however all normal BMI range workers reported to experience pain and discomfort at least in one body region. Meanwhile, most of the respondents who smoked had suffered musculoskeletal pain. As shown in Table 1.4, there is no significant

relationship between the presence of musculoskeletal pain in body region against age, BMI range and smoking status (p>0.05). Although age was a significant factor that can contribute to development of MSDs (Anton & Weeks, 2016), but there it contradicts with the current findings (p>0.05).

A research by Viester et al., (2013) reported that BMI was associated with MSDs, especially in the lower extremity such as knees and foot. The risk of developing MSDs and osteoarthritis increased in working individuals with high BMI range (>24.9 kg/m²) especially if they do tasks with prolonged standing. The reason why the current findings showed no similarities with previous study could be due to the small sample size which affected the results. Other reason could be that normal BMI range and respondents who aged below 25 years old might not directly affect the presence of MSDs in current findings might be due to other factor such as ergonomics. A study by Palmer et al. (2003), stated that there is a significant association between smoking and musculoskeletal pain as smoking can cause coughing, which will lead to back pain. However, according to Baldwin et al. (2017), mentioned in their research that healthy individuals also can experienced musculoskeletal pain. This can be due to the working conditions as well as ergonomic factors that may contribute to musculoskeletal symptoms. The difference between current study and previous studies could be because of relatively small sample size which revealed the insufficient of statistically significant differences.

Table 1.4 Association of MSDs against personal risk factors

Variable	Self-perceived MSDs in Body Area(s)			
	With MSDs (n=12)	Without MSDs (n=2)	x^2 (df)	p-value
Age				
≤ 25 years old	6	2	0.186 (1)	0.308
≥ 26 years old	6	0		
BMI range				
Abnormal	9	2	0.425 (1)	0.604
Normal	3	0		
Smoking status				
Smoker				
Non-smoker	7	1	0.825 (1)	0.527
	5	1		

Advanced Ergonomic Risk Assessment

In this part, observation by recording the workers performing their work activity was then analysed using REBA worksheet. The first activity was packing vegetables by a worker from fresh market department. The second activity was stocking item by a worker from grocery department as shown in Table 1.5.

Table 1.5 REBA findings according to work activity

Parameters	Activity 1	Activity 3
		
Table A posture score	3	4
Force/load score	0	0
SCORE A	3	4
Table B posture score	5	2
Coupling score	0	0
SCORE B	5	2
Activity score	1	0
Table C	4	4
REBA SCORE	5	4
RISK LEVEL	Medium	Medium

Based on the Table 1.5, both activities had been assessed and identified to have medium risk level having score range between 4 to 5 based on the standardized score by McAtamney & Hignett (2004). Changes need to be implemented in order to reduce the progression of musculoskeletal disorders among supermarket workers.

Recommendation to reduce the risk of musculoskeletal disorders among workers

There are several interventions to reduce the risk of MSDs through administrative controls measures. This includes a proper training need to be conducted especially for new workers. Training and providing standard operating procedures on how to handle items at supermarket can minimize the stress exerted on worker's body. A good working posture is one of the best way to prevent work-related injuries (Elaine & Chao, 2004). Workers that worked in fresh market department are exposed to repetitive tasks which is packing vegetables. A short-handle scoop can be used to aid in packing small-sized products such as chillies and bean sprouts in order to minimize the stress on the wrists. Other administrative controls measure can involve job rotation which can control the workers from being exposed to the same ergonomic risk factors, resulting from job boredom and stagnation. Employees can be rotated to different job tasks in various department in supermarket for every two weeks.

In terms of elimination of hazard, supermarket companies can opt for online selling through e-commerce website. By this method, workers do not have to stock items as customers are virtually shopping online. This can reduce the risk of injuries caused by manual handling specifically targeting on stockers in grocery department.

CONCLUSION

As a conclusion, the top three most-troubled body part identified among supermarket workers in Kajang were shoulders, feet and lower back. They experienced pain in that area particularly due to prolonged standing while working and majority of them used hands to handle materials. There is no significant association between the presence of musculoskeletal symptoms between age group, BMI range, and smoking status among workers. Based on the Rapid Entire Body Assessment findings, it could be seen that the workers had medium risk level of awkward posture and changes need to be implemented in terms of administrative controls in order to minimize the risk of injuries in the future.

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