Musculoskeletal Disorder Prevalence: A Comparative Study among Manufacturing Industries

Nor Hazana Abdullah[1,*], Zulkeflee Abdullah[2], Nor Aziati Abdul Hamid[1], Rosli Asmawi[3]

[1]Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400 Batu Pahat, Johor
[2]Fakulti Kejuruteraan Pembuatan, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia
[3]Faculty of Mechanical and Manufacturing Engineering, Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400 Batu Pahat, Johor

[*]Corresponding e-mail: hazana@uthm.edu.my

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ABSTRACT – Prevalence of Musculoskeletal disorder (MSDS) has dramatically increased from five cases in 1995 to more than 400 cases in 2012. Manufacturing workers are more at risk due to the nature of their works which include excessive force, repetitive movements and poor posture. However, different industries pose different contextual risks based on the production processes. This study attempts to compare MSDS among employees from three manufacturing industries namely electronics, furniture and food and beverages. It is found that there are significant differences of musculoskeletal disorder prevalence among industries for all body parts except for upper back.

1. INTRODUCTION

Prevalence of Musculoskeletal disorder (MSDS) has dramatically increased from five cases in 1995 to more than 400 cases in 2012 in Malaysia [1-2]. Manufacturing workers are more at risk due to the nature of their works which include excessive force, repetitive movements and poor posture. However, different industries pose different contextual risks based on the production processes, level of automation and types of tools and machineries used. According to US Labour Statistics, Musculoskeletal Disorders incident rate is 41/10,000 workers across manufacturing industries. The highest number of incidents is reported in the beverage and tobacco industry followed by wood product and leather and allied product [3].

However, in Malaysia, very limited study has focused on the prevalence of MSDS in different manufacturing industries. Majority of studies on manufacturing industries are old and dated back to 1994 with focus on electronics industry [4][5][6] while recent studies (above 2015) have been focusing on office workers [7][8][9], dentists [10], plantation workers [11] and general population including schools [12]. Only one recent study in electronic industry [13].

Studies on Malaysia manufacturing industries reported that seating postures, frequent stooping, highly repetitive movements, intermittent bending, constant walking and vibration are risk factors that contribute to prevalence of MSDS among employees in electronic industries. Abdul Aziz [13] found that electronic workers are more at risk of MSD especially in the leg region due to prolonged standing while working. In addition to risk factors commonly associated with electronic workers, furniture workers faced more manual works that involved heavy lifting, force exertion and high level of noise due to sanding and cutting of woods [14]. In Nejad's study in Iran furniture companies, the most commonly affected regions among the subjects were the knees, lower back and wrists/hands.

The study on food and beverage industry workers is almost absent except for one study in Nigeria [15] in beverage industry. Comparative study among manufacturing industries is also very limited with only one study in China that compared metal, electrical appliances and furniture industries [16] which warrant this study to fill in the empirical gap

2. METHODOLOGY

Two hundred twenty six manufacturing respondents answered the Cornell Musculoskeletal Discomfort Questionnaires which include both hand assessment and total body assessment. The assessments were conducted face to face to increase reliability of the collected data. Before further analysis was done, reliability of the instrument was tested. The instrument was established as reliable with Alpha Cronbach of 0.976 [17].

The participating respondents were either worked in electronic manufacturing companies, furniture companies or food and beverage companies. The distribution of the respondents was quite even with 75 employees from furniture industry, 80 employees from electronic industry and 71 employees from food and beverages.

In terms of respondents' profile, male respondents were higher at 54.4% compared to female respondents (45.6%). In terms of age, 30.5% of respondents aged between 23 to 27 years old followed 25.7% of those aged 28-32 years old. In essence, majority of employees were below 40 years old. Majority of respondents were in common production (47.8%), while 28.8% in packaging and 12.4% is handling the machine as shown in Table 1.

Table 1 Demographic Profiles

Demographic Profiles			
		Freq	%
Gender	Male	123	54.4
	Female	103	45.6
Age	18-22 years old	24	10.6
	23-27 years old	69	30.5
	28-32 years old	58	25.7
	33-37 years old	29	12.8
	38-42 years old	21	9.3
	Above 42 years old	25	11.1
Type of Tasks	Production	108	47.8
	Packaging	65	28.8
	Monitoring quality	21	9.3
	Handling of machine	28	12.4
	No response	4	1.7
Hours of Overtime	0-2 hours	61	27.0
	3-5 hours	52	23.0
	6-8 hours	58	25.7
	9-11 hours	24	10.6
	> 11 hours	30	13.3
	No response	1	0.4

Responses from the questionnaires were analyzed descriptively to derive the frequencies, means and standard deviations of reported pain at various body parts. Analysis of variance (ANOVA) was used to compare the scores of MSDS among the industries. Post Hoc test was used to determine which industry that significantly different from each other.

3. RESULTS

The results from Table 2 and 3 indicates that MSDS prevalence is significantly different across electrical, furniture and food and beverage industries for all body parts except lower back.

Table 2 ANOVA for Upper Extremities

		Right Hand	Left Hand	Shoulder	Neck
Types of Industry	*n*				
Furniture	75	1.879	1.824	1.892	2.351
Electronics	80	1.651	1.651	2.104	2.117
Food and Beverages	71	1.855	1.752	2.406	2.526
F		3.555	3.819	8.272	5.238
p-value		0.03*	.023*	0.001**	0.006*

Table 3 ANOVA for Body Parts

		Lower Back	Upper Back	Lower Body	Upper Body
Types of Industry	*n*				
Furniture	75	1.993	2.107	1.929	1.921
Electronics	80	2.325	2.208	2.162	1.932
Food and Beverages	71	2.542	2.178	1.863	2.218
F		8.093	.343	4.830	5.822
p-value		0.001**	.710	0.009*	0.003*

Duncan's Post Hoc test revealed that electronics employees reported significantly higher prevalence of right hand, left hand, neck, shoulder, lower back, upper body and lower body compared to furniture and food industry. There are no significance differences between furniture and food and beverage industries.

This result is consistent with the Liu's finding [16] where electronic workers had higher prevalence of MSDC compared to those in metal and wood industries.

4. CONCLUSIONS

This study concludes that electronic employees were more prone to MSDS associated risks compared to other industries. This is because majority of the local employees were older and thus have prolonged exposure to risk factors such as repetitive movements and awkward posture. Other industries pose fewer risks as they employ foreign workers on contractual tenure which eliminates the physical health issue.

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