

Back Pain and the Observed Factors among Oil Palm Workers

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Abstract - Direct and indirect costs of treating Musculoskeletal Disorders (MSDs) are on the increase and thus financially alarming. Back pain is one of the prominent diseases among oil palm workers. A cross-sectional study was conducted to identify the prevalence of back pain and the observed ergonomics risk factors. The two techniques used were (1) survey using modified Nordic Musculoskeletal Questionnaire (NMQ) and (2) site observation with recorded working activities. Subjective pain or discomfort on different body regions were used (no pain/ sometimes in pain/ always in pain) to determine the prevalence of MSDs symptoms. More than 100 oil palm workers participated in this study. However, there were only 88 completed survey forms returned. Result shows that the commonest region of complaint was lower back (99%) which consisted of ‘always in pain’ 18% and ‘sometimes in pain’ 81%. This is followed by upper back (85%) which consisted of ‘always in pain’ (8%), and ‘sometimes in pain’ (77%). The complaints of pain were also high at the area of right shoulder (81%) and left shoulder (78%). Awkward posture, excessive force, lifting heavy load are the observable problems that repeatedly occur while workers were performing their work duty. The prevalence of work-related complaint among oil palm workers is high. Due to that, it is important to carry out a systematic ergonomics risk assessment to effectively estimate the ergonomics risk factors that exist in all work processes.

Index term - Back pain; posture; biomechanical exposure

1. INTRODUCTION

As Malaysia continues to develop and the requirement for ‘physical’ workers in the construction and plantation sectors are also on the rise, there has also been an increase in the number of MSDs that have been reported to Social Security Organization (SOCISO)[1]. Statistics show that in 2006 there are 15 cases of MSDs reported. The

number has increased to 161 cases in 2009. Reporting cases keeps on increasing to 449 cases in 2012. In a review paper by Sukadarin et al. [2], it was found that agriculture workers exposed themselves to many physical and psychosocial agents that can put them in danger. So, it is no surprise that agriculture workers were among the highest in MSDs cases compared to other occupations [3]. The MSDs is very common especially in oil palm plantations, where workers have to face many ergonomics issues that harm their health in their daily work routine.

Many researchers have started to highlight ergonomics issues among oil palm workers [4]–[7]. It was found that, MSDs especially back pain is the most common complaint received from the workers. Most of the reasons are because of the work nature that needs workers to perform physical works manually. It is possible to mechanized some of the chores, but, to introduce mechanized technology to reduce manual work in oil palm activities, is not an easy task [8].

MSDs can be very chronic. Punnet and Wegman [9] found that, in the United States, Canada, Finland, Sweden and England, MSDs cause more work absenteeism or disability than any other group of disease. Workers who suffer from MSDs were always incapacitated and in pain and this surely can impact several aspects of an individual's performance [10]. Concentration at work, stamina, alertness, rationality can also be affected [11] and eventually put the workers in other risky conditions such as occupational injuries and accidents.

Due to the impact of MSDs, more works have to be done to ensure workers in oil palm plantations are protected. The ergonomics risk factors need to be managed so that it can be controlled as low as practicable. Therefore, this study is conducted with the aim to identify the observed ergonomics risk factors that could contribute to back pain among oil palm workers.

2. METHODOLOGY

A cross-sectional study was conducted at an oil palm plantation located in the West Coast of Peninsular Malaysia. Face-to-face interviews, video recordings and direct observation were performed. Information on workers was gathered using pre-screened questionnaire. Workers' complaints towards musculoskeletal symptoms were also accounted for in the survey using modified Nordic Musculoskeletal Questionnaire (NMQ) [12]. In order to determine the prevalence of musculoskeletal discomfort among workers, subjective pain or discomfort level on different body regions were used (no pain/ sometimes in pain/ always in pain). This study is based on the workers normal working hours, 26 days a month, 8 hours working daily including 1 official break (30 minutes) and 1 additional break (15 minutes).

3. RESULTS AND DISCUSSION

3.1 Demographic

Demographic data of respondents are shown in Table 1. Total number of respondents is 88 and all are male. The workers are between 18-50 years old with the highest frequency at 28 years old. Their weight is between 40 and 70 kilogram while their height is between 130 and 180 centimeters. All respondents are foreign workers from Indonesia. Of the total respondents, 65.9% are married, 33.0% are single and 1.1 % widower. In addition, most workers have a level of education up to primary school, 36.4% and only 15.9% of workers have education up to high school. 28.4% of the workers never went to school.

Table 1 Demographic Data (N=88)

Characteristics	Mean
Age	28.56
Weight	52.82
Height	159.64
Level of Education	n (%)
No Education	25 (28.4)
Primary School	32 (36.4)
Lower Secondary School	17 (19.3)
High School	14 (15.9)
Marital Status	n (%)
Married	58 (65.9)
Single	29 (33.0)
Widower	1 (1.1)

3.2 The classification of workers within job scope

The breakdown of the number of workers involved in this study based on their job scope is shown in Table 2. The highest number of respondents is cutter (37.5%), followed by loose fruit collector (36.36%), frond stacker (12.5%) and drivers (13.63%).

Table 2 Number of Respondents and the Scope of Work

No	Scope of work	n	%
1	Cutter	33	37.5
2	Frond Stacker	11	12.5
3	Loose fruit collector	32	36.36
4	Truck Driver	12	13.63

3.3 Survey using modified Nordic Musculoskeletal Questionnaire (NMQ)

The survey questionnaire was distributed and administered to ensure the data gathered are meaningful. The results of the survey can be seen in Table 3. During data collection, more than 100 oil palm workers participated in this study. However, only 88 completed survey forms were returned. Result shows that the commonest region of complaint was lower back (99%) which consisted of ‘always in pain’ (18%) and ‘sometimes in pain’ (81%). It was followed by upper back (85%) which consisted of ‘always in pain’ (8%), and ‘sometimes in pain’ (77%). The complaints of pain were also high at the areas of right shoulder (81%) and left shoulder (78%).

Table 3 Respondents’ pain / discomfort on different body regions

Body Parts	No pain		Pain				
	n	%	Sometimes in Pain		Always in Pain		PAIN
	n	%	n	%	n	%	%
Neck	23	26	58	66	7	8	74
Shoulder R	17	19	63	72	8	9	81
Shoulder L	19	22	61	69	8	9	78
Elbow R	49	56	36	41	3	3	44
Elbow L	54	61	32	36	2	2	38
Upper Back	13	15	68	77	7	8	85
Lower Back	1	1	71	81	16	18	99
Finger R	53	60	34	39	1	1	40
Finger L	54	61	33	38	1	1	39
Upper Arm R	37	42	49	56	2	2	58
Upper Arm L	39	44	46	52	3	3	55
Lower Arm R	48	55	39	44	1	1	45
Lower Arm L	48	55	39	44	1	1	45
Wrist R	47	53	39	44	2	2	46
Wrist L	49	56	37	42	2	2	44
Ankle R	54	61	32	36	2	2	38
Ankle L	54	61	32	36	2	2	38
Buttock R	20	23	67	76	1	1	77
Buttock L	21	24	66	75	1	1	76
Knee R	39	44	47	53	2	2	55
Knee L	38	43	47	53	3	3	56
Calf R	25	28	47	53	16	18	71
Calf L	25	28	47	53	16	18	71
Foot print R	59	67	27	31	2	2	33
Foot print L	58	66	29	33	1	1	34
Thigh R	42	48	45	51	1	1	52
Thigh L	42	48	45	51	1	1	52

R = Right L = Left

3.4 Prevalence of back pain (upper back pain / lower back pain) within scope of work

Table 5 Ergonomics risk factors by work process

The result of musculoskeletal discomfort survey showed that the majority of workers regardless of their scope of work suffered from lower back and upper back discomfort or pain. From Table 4, it clearly shows that more than 70% workers from each work unit complaint of pain at the upper back and lower back areas. However, when we look at the lower back category, about 90% of workers are either in the ‘sometimes in pain’

Table 4 Respondents’ complaint on upper Back and lower back

Respondents’ complaint on Upper Back (%)			
	No pain	Sometimes in pain	Always in pain
Cutter	6	81.82	12.12
FronD Stacker	18.18	72.73	9.1
Loose fruit collector	25	71.88	3.13
Truck Driver	8.33	83.33	8.33
Respondents’ complaint on Lower Back (%)			
	No pain	Sometimes in pain	Always in pain
Cutter	0	78.78	21.21
FronD Stacker	9.1	72.73	18.18
Loose fruit collector	0	81.25	18.75
Truck driver	0	91.67	8.33

or ‘always in pain categories.

3.5 Observing work activities to understand the occurrence of back pain

Observation is probably the most often used approach to identify risks and hazards at work. Daily respondents’ work activities were observed. By using the observation technique, problematic postures and other risk factors can be easily addressed. All workers were told to perform their work duties as usual. In addition, without interrupting the working processes workers’ movements were recorded using video camera. This was done to ensure that the actual activities were captured so that the ergonomic risk factors can be re-evaluated in the laboratory. The ergonomics risk factors for the oil palm workers have been summarized in Table 5. Awkward posture, excessive force, and lifting heavy loads are the main problems that repeatedly occur while the workers performed their work.

Work process scenario		Observed Risks factors
<p>CUTTER</p>  <p>Fresh fruit bunch should be cut as soon as the fruit is ripe to avoid a reduction in the value of oil.</p>	<p>Carry pole (sickle) from tree to tree</p> <p>Locate sickle to the correct position (bunch stalk) so that the cutting process can be performed</p> <p>Pull pole with a lot of force to ensure that the FFB stalk is cut</p>	<p>-Excessive force</p> <p>-Force while grasping pole</p> <p>-Weight handling (hanging weight of own body)</p> <p>-Extreme neck posture while head up and backward to look at the FFB due to tall palm trees</p> <p>-Excessive force to pull pole strongly</p> <p>-High force while grasping pole to ensure the pole is in place</p>
<p>FROND STACKER</p>  <p>Cut the dropped FFBs' stalk. It is to ensure that the fruit taken to a processing plant is the oil palm seeds only</p> <p>*Cut and stack palm fronds</p> <p>*Hold and carry the dropped fronds from trees to designated area so that it can be collected</p>	  	<p>-Excessive force (cut the stalk by using an axe)</p> <p>-Force while grasping heavy axe</p> <p>-Bending</p> <p>-Weight lifting</p> <p>-Weight lifting</p> <p>-Both hands above head level while carrying fronds (weight) / Bending</p> <p>-Uneven surface</p> <p>-Exposed to danger such as cut while lifting the fronds that have thorns on the branches</p>
<p>LOOSE FRUIT COLLECTOR</p>     <p>Collect loose fruits using rake and broom</p> <p>Fruits collected are sent to the designated area to be collected by truck.</p>	<p><u>Using short broom</u></p> <p>-Squatting and stooping for long periods while sweeping the fruits</p> <p>-Hand tend to repeatedly reach out while squatting</p> <p><u>Using long broom:</u></p> <p>-Over reaching to get far fruits</p> <p>-Heavy load</p> <p>-Uneven surface, so the effort to push wheelbarrow is higher</p> <p>-Force while grasping full load wheelbarrow</p>	
<p>TRUCK DRIVER</p> <p>MTG - used for areas that are flat and easy to access</p>		<p>-Driving vibrating truck</p> <p>-Noisy engine</p> <p>-Awkward upper body posture</p> <p>-Workers need to look back frequently, every time the machinery lifting FFB from ground into carts.</p> <p>-Extreme neck rotation is found to be the highest ergonomic risk for this task.</p>
<p>TRUCK DRIVER</p> <p>Mechanical buffalo - used at hilly terrain and uneven ground</p>		<p>-Vibrating truck</p> <p>-Noisy engine</p> <p>-Non-padded seat nor lumbar support</p> <p>-Still need to carry a heavy burden to collect FFB from ground using 'iron chock' and put on the cart machine</p> <p>-The risk basically same as cutter, even greater due to the noise and vibration issue.</p>

In total, 88 sets of questionnaires were analyzed. Majority of respondents experienced MSDs in various body regions. Results showed that each work process in relation to oil palm works have high tendency to put workers at risk of having MSDs. The lower back and upper back are the two areas that affected most of the workers. Upper back or thoracic back is the area of the back where the ribs are attached. Upper back pain is referred to the pain at the area between the neck and low back. Human upper back is important to ensure that human body is strong and stable. Meanwhile, the lumbar spine or lower back is meant to provide the body with mobility.

At upper back, muscles are quite large. So, upper back pain usually is related to muscle problems. Sometimes the pain is also due to joint dysfunction. Unlike lower back pain, upper back pain is not easy to diagnose because muscle irritation cannot be easily detected using diagnostic tools. The lower back is more vulnerable from chronic condition. Many cases of lower back pain can be detected on a lumbar magnetic resonance imaging (MRI), depending on the nature of the discomfort. Due to that, many researchers devoted their time to study low back pain [13]–[15].

Upper back and lower back discomfort usually happened due to repeated activities, twisting motion, poor posture, and overuse of muscles or due to injuries received while engaged in heavy physical activities. Carrying objects, throwing, pushing and pulling are the common factors that can contribute to back pain [16]. Prolonged sitting at a desk, doing static works without moving a lot also can cause upper back or lower back pain as the muscles are tightened and become stiff.

Working in oil palm plantation, with a bunch of fresh fruit that can weigh an average of 30 kg – 50kg and the tool can weigh an average of 5 kg; obviously can be very harmful to workers. Pulling a sickle rapidly to cut the fruit stalks indirectly caused fast trunk flexion. In relation to that, previous studies had shown that fast trunk flexion or extension is associated with low back disorders [16, 17].

The full cycle of activities to collect fresh fruit bunch and at the same time maintaining the plantation in a neat and tidy condition so that the process to cut and to collect the fruits every day is smooth, exposed workers to excessive force. The whole body areas are involved. Result showed that the back area is the most affected area. Pushing a wheelbarrow or pulling a sickle requires a lot of energy especially to cut the fruits while the neck is bent up backwards at 90 degrees. Those kind of activities have also been proven to cause back and neck disorders [18, 19]. Despite having MSDs, the workers still have to show up at work every day as it is the only means for them to earn a living.

All workers are entitled to a safe and healthy work environment. Ergonomics risk exposure cannot simply be eliminated therefore the risk of MSDs (back pain) has to be reduced as low as practicable [21]. Workers' personal habits, psychosocial factors, and job factors, need to be determined to assist workers. The workers need to be consulted in order to detect and address back related problems in their working activities [22]. Every workers need to be educated on healthy working posture and safe work limits so that they know how to set the limits on themselves while performing their jobs [23].

CONCLUSIONS

This study is to identify the prevalence of MSDs among oil palm workers. Result showed that the two body areas most affected were the lower back and the upper back. Extreme physical activities were found to be the main cause of the problem. Therefore, it is necessary to perform a systematic ergonomics risk assessment to evaluate the existence of ergonomics risk factors in each work process. Control measures are also warranted to ensure those complaints regarding MSDs are well managed and proper actions are taken.

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