

ERGONOMIC ASSESSMENT OF
MUSCULOSKELETAL SYMPTOMS AND
ASSOCIATED RISK FACTORS AMONG
PINEAPPLE PLANTATION WORKERS

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Malaysia sedang berusaha untuk menjadi salah satu pengeluar buah nanas yang terbesar di Asia Tenggara. Memandangkan terdapat banyak sektor ladang nanas yang baru dibuka, permintaan pekerjaan untuk bekerja di sektor ini juga semakin meningkat. Kerja-kerja pertanian sentiasa dikaitkan dengan kadar permintaan yang tinggi dan kegiatan kerja yang berat dan bersifat intensif. Oleh itu, pekerja di sektor perladangan sentiasa berisiko untuk mendapat Gangguan Muskuloskeletal Berkaitan Pekerjaan. Aktiviti pekerjaan perladangan nanas bermula dengan penanaman, pemeliharaan, merumput secara manual dan penuaian. Kegiatan pekerjaan ini melibatkan corak kerja yang berulang, memakan masa yang lama dan membebankan. Para pekerja bukan sahaja perlu bekerja dalam pelbagai postur canggung yang berpanjangan, malah, terdedah kepada kerja pengendalian manual semasa aktiviti penuaian. Tiga objektif utama kajian ini adalah untuk mengenal pasti kelaziman simptom muskuloskeletal dalam kalangan pekerja ladang nanas; menganalisis penilaian risiko ergonomik dalam kalangan pekerja nanas; dan menguji skor penilaian risiko ergonomik dari segi kesahannya. Proses pengumpulan data telah dilakukan bagi tiga ladang nanas yang berlainan di Pahang selama tiga bulan. Soal selidik yang diubahsuai diadaptasi dari Nordic Musculoskeletal Questionnaire telah digunakan semasa mengenal pasti kelaziman simptom muskuloskeletal dalam kalangan pekerja. Aktiviti dinamik pekerja direkodkan dan dengan menggunakan gambar statik, dua jenis penilaian risiko ergonomik iaitu *Ovako Working Posture Analysis System* (OWAS) dan *Manual Handling Assessment Chart* (MAC) telah dijalankan. Selepas itu, keputusan analisa disahkan menggunakan teknik *Surface Electromyography* (sEMG). Hasil kajian menunjukkan bahawa 62.1% pekerja mengalami sakit bawah belakang, diikuti oleh 58.2% pekerja yang mengalami sakit pinggang dan 33% pekerja merasakan kesakitan pada lutut mereka. OWAS mengenal pasti tiga aktiviti; penanaman (39.8%), merumput secara manual (42.7%) dan penuaian (60.2%) dikategorikan sebagai AC 3. Sementara itu, penanaman (17.5%) dan rumput manual (27.2%) jatuh ke dalam kategori AC 4 yang ditunjukkan sebagai sangat berbahaya. Analisis MAC menunjukkan bahawa aktiviti mengangkat dan membawa beban semasa proses penuaian dianggap berbahaya. Skor akhir aktiviti mengangkat ialah 13-20 (100%) yang menandakan langkah kawalan diperlukan tidak lama lagi. Sementara itu skor akhir aktiviti membawa beban ialah berskor 5-12 (33.3%) yang menandakan langkah kawalan diperlukan dalam masa terdekat dan 13-20 (66.7%) yang menandakan tindakan langkah kawalan diperlukan tidak lama lagi. Hasil keseluruhan dari kajian ini menunjukkan bahawa pekerja perladangan nanas amat terdedah kepada faktor risiko bahaya ergonomik seperti postur canggung dan mengangkat beban yang berat. Kajian ini mencadangkan untuk mengaplikasi prinsip ergonomik, seperti mekanisasi peralatan untuk menghapuskan postur canggung dan tugas pengendalian manual. Jika tidak berupaya untuk melaksanakan sebarang mekanisasi, latihan terus menerus yang mencukupi dan berkesan harusla disediakan. Dengan ini, para pekerja dapat melaksanakan amalam kerja yang selamat.

ABSTRACT

Malaysia is on an attempt to become one of the largest producers of pineapples in Southeast Asia. As there are many new developed pineapple plantation areas, there are high job demands to work in this sector. Agricultural works is always associated with high demand, heavy and labor intensive works. Thus, plantation workers are constantly at risk for developing Work-Related Musculoskeletal Disorders. Pineapple plantation job activities start with planting, maintaining, manual weeding and harvesting. These job activities are known as quite repetitive, long time consuming and laborious in nature. In spite of various prolonged awkward postures, the workers also exposed to heavy manual work during harvesting activity. This study aims to identify the prevalence of musculoskeletal symptoms among workers of pineapple plantations; analyze the postural analysis assessment; and to test the postural scores in terms of its validity. Data collection was conducted in three different pineapple plantations in Pahang which took three months. A modified questionnaire adapted from Nordic Musculoskeletal Questionnaire was used during recognizing the prevalence of musculoskeletal symptoms among the workers. Dynamic activities of workers were recorded and by using stand still photos, two type of postural assessment; Ovako Working Posture Analysis System (OWAS) and Manual Handling Assessment Chart (MAC) were carried out. After that, the results were validated by using Surface Electromyography (sEMG) technique. The survey results showed that 62.1% of workers experienced lower back pain, followed by 58.2% of workers experienced pain on the waist and 33% of workers felt pain on their knees. OWAS identified three activities; planting (39.8%), manual weed (42.7%) and harvesting (60.2%) were categorized mainly in Action Category 3 which indicated distinctly harmful. Meanwhile, planting (17.5%) and manual weed (27.2%) also fell into Action Category 4 which indicated as extremely harmful. MAC assessment for lifting activity showed that 100% were in level 3 (risk level 13-20), signify that action required soon. On the other hand, carrying activity showed that 33.3% were in level 2 (risk level 5-12), signify that action required near future whereas 66.7% were in level 3 (risk level 13-20) which signify action required soon. The overall result from the study shows that pineapple plantation workers are highly exposed to ergonomic hazards risk factors such as awkward postures and heavy lifting. This study suggests that ergonomic intervention such as mechanization of tools and equipment should be implemented in order to eliminate poor postures and manual handling task. In case of incapability for any mechanization, adequate and effective training should be constantly provided. Therefore, workers can implement safe work practices.

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LIST OF ABBREVIATIONS

| | |
|-------|---|
| WMSDs | Work-Related Musculoskeletal Disorders |
| MSDs | Musculoskeletal Disorder |
| SPSS | Statistical Package for Social Sciences |
| LBP | Low Back Pain |
| OWAS | Ovako Working Posture Analysis System |
| MAC | Manual Handling Assessment Charts |
| sEMG | Surface Electromyography |

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