

A Study of Postural Safety and Low-Cost Electromyography (EMG) Device Towards Grocery Workers in Kota Samarahan, Sarawak

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Abstract: Body posture is one of the most important parts when lifting an object as it can causes injury if the wrong technique and body posture were used. A worker will injure their low back if a bad posture is not in consideration. A good body posture is recommended among workers to reduce the chance of injury while lifting and improve their postural safety. The main objectives of this study are to observe the body posture of the worker during lifting and study the comparison of using lower back support when lifting. It also investigates the muscle activity of the worker during heavy lifting using EMG and simulates the worker's movement using CATIA Software for Rapid Upper Limb Assessment (RULA) results. The selected grocery was chosen in Kota Samarahan, Sarawak with 7 male respondents are identified to undergo this study. The results show that the worker with lower back support tends to show raw EMG signal with lower muscle activity compared to without using lower back support. Thus, using belt support can reduce muscle activity by up to 67.4% compare to not wearing back support. Raw EMG signals also show 3010 amplitude (mV) muscle activity if postural safety of the workers improved by following the NIOSH lifting Recommendations.

Keywords: *Postural Safety, Electromyography, Low-Cost EMG, lower back pain, CATIA, Grocery Workers*

INTRODUCTION

Low back pain (LBP) is a serious health problem that must be taken care of by personnel. It is very common for a worker to experience symptoms of lower back pain in their working life. This is due to the amount of repetitive work that involves lifting, bending, and awkward position of the body that they must overcome. The worker that encounters lower back pain will contribute impact for the company, family, and government. The total costs of direct medical expenditures and loss of work productivity combined related to low back pain has been estimated to be as high as \$635 billion annually in the US [1, 2]. A lot of expenses must be pay to give treatment to the worker that have low back pain in working their working place.

Furthermore, some company productivity has been decreased due to workers that have to take medical leave due to their lower back pain problem. Lower back

pain was the number one symptom complaint express by patient aged 25 to 60 years old and it is the costliest medical problem for the group age 30 to 60 years and it is also the most common health problem among older adults that results in pain and disability [3, 4-8]. Lower back pain has a direct relationship between overweight, duration of the employee working, age, and leisure-time physical activity [9]. There is also research showing that standing without the freedom to sit was associated with also related to LBP issues [9]. Other than that, different occupational physical, and psychosocial were factors also associated with LBP in sitting compared with standing workers [10].

A good postural will lead to the good safety of the workers. This also can prevent and reduce LBP and work musculoskeletal disorder (WMSD) problems among the workers. According to Malaysian's Factories and Machinery Act (1967): Section 12 stated that no person shall be employed to lift, carry, or move any load

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