CORRELATION BIOMECHANICAL METHOD OF MANUAL MATERIAL HANDLING WITH LOW BACK PAIN

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Abstract

Low back pain is feeling of pain in the lumbosacral and sacroiliac region, often spreading to the upper and lower limbs. Manual material handling (MMH) is still needed because it can be done in the limited space and dependent of physical activity. If MMH is not ergonomically used, it would cause tissue damage, due to excessive lifting load. The aimed of research is to determine the relationship of manual material handling with low back pain. The study design was observational analytic with cross sectional approach. Population were all of unloading workers in the Marine Nusantara Port, Kendari, as many as 268 people. The purposive sampling technique was used to recruit 120 respondents. Data was analyzed using Chi Square test, as well as alternative of Kolmogorov-Smirnov test. Results of study showed a correlation between manual material handling with the incidence of low back pain (p= 0.003). The other risk factor, such as age (p= 0.537), smoking (p = 0.988), exercise habits (p= 0.854), overweight (p= 0.306) did not significantly correlated with low back pain. It can be concluded that manual material handling is the determinant factor of low back pain, among Marine Nusantara Port, Kendari.

Key Words: manual material handling, biomechanical methodes, low back pain, unloading workers, physical activity, Nusantara Marine Port

INTRODUCTION

Industrial development has brought convenience to human life, but there are still be a serious problems among workers, that it could not be overcome with existing technology. Interaction between workers and their environment and work tools can have a negative impact on humans[1]. Indonesia has business institutions and industries that they still use human resources in material transfer. Although relatively modern industries have used many machines as tools for moving materials, manual handling or manual material handling (MMH) activities are still needed because they have advantages over using tools[2].

Manual material transfer can be done in limited space, where the worker's activity relies heavily on physical strength to lift the goods. If manual material handling (MMH) is not done ergonomically, it will cause an accident in the industry, which is called as over lifting and carying exertion. This accident could caused the damage of body tissue due to excessive weight lifting[3].

Lower Back Pain (LBP) is one of occupational health problems. The inventor of occupational medical science Ramazzini B. (2009), stateds that rough and irregular movement, accompanied by unnatural body positions, can cause the damage of body structure[4]. LBP is the most common medical condition among 85% workers. Hult and Rowe found that 60% and 56% of employees in Sweden and America, suffering from back pain at any given time during work. The United States occupies the lower backstroke prevalence of second rank after upper respiratory tract illness resulting in illness[5]. In 2012, out of about 1.8 million workers with occupational illness recorded 452,000 were new cases in the last 12 months, while 80% of new cases were musculoscelatal disorders (upper limbs or back problems), stress, depression or anxious. The prevalence of musculosceletal disorder was 120,000 cases among 52,000 LBP cases[6].

The historical aspect of the location of Nusantara Marine Port of Kendari is the old port area that became the forerunner of the growth of Kendari City. In the beginning growth of Kendari City only occurred in the port area. Along with the time, population, activities and community system, the growth in Kendari City were not only occurred in the

port area but grow to the areas of the port, even began to shift to the west of the city of Mandonga District. Location of the port until now did not longer grow because the development of the city now leads to the mainland. These developments tend to leave abandoned coastal and harbors areas and did not developing properly. Based on the location and function of the port, the Nusantara Marine Port, Kendari, has a strong connection with the regional economic condition, as the strategic port for importing large quantities materials from another areas[7].

Data from Health Office of Nusantara Marine Port Kendari reported a various of disease found in each month. Thar are acute respiratory syndrome infection, hypertension, hemiparese and others. Low back pain becomes one of the illnesses that is reported to be repeated every month[8]. This study aimeds to analyze the correlation of manual biomechanical method of material handling with low back pain occurrence on loading and unloading workers (LULW) at Marine Nusantara Port, Kendari.

RESEARCH METHODS

This research was an observational analytical study with cross sectional design. The research was conducted in September until December 2015 at the Marine Nusantara Port of Kendari. This research has obtained a letter of ethics from Health Research Ethics Commission, University of Halu Oleo, with number: 746/UN29.20/PPM/2015. The population of research was LULW, amounting to 286 people and selected 120 samples using purposive random sampling technique. LULW who suffered from low back pain, before working at the port site, had metabolic disease, postoperative back and refused to be the respondents in the exclusion of the study sample.

Manual Material Handling is measured using the Recommended Weight Limit (RWL) and Lifting Index (LI) form while low back pain is measured using straight leg raising test with pain scale measurement using Numeric Rating Scale (NRS). Confounder variable, such as age, smoking, exercise habits, and overweight with low back pain occurences, were analyzed using Chi-square with combining cells and Kolmogorov- Smirnov as the alternative test.

RESULTS

Based on the results of statistical test analysis as in Table 1, was obtained p-value = 0.003. It can be concluded that there was a significant correlation between manual material handling with low back pain occurences.

Table 1. Relation Of Manual Material Handling With Low Back Pain Occurence, On TKBM, Port Of Nusantara, Kendari

MMH	LBP								*Total*		ρ
	No		Light		Moderate		Heavy				
	n	%	n	%	n	%	n	%	n	%	
Low	10	8,3	2	1,7	0	0,0	0	0	12	10,0	0,003
Medium-High	30	25,0	18	15,0	34	28,3	26	21,7	108	22,5	

Table 2. Relation Of Confounding Variables With Low Back Pain Occurrence On TKBM, Port Of Nusantara, Kendari

Age	LBP								Total		ρ
	No		**Light**		**Moderate**		**Heavy**				
	n	%	n	%	n	%	n	%	n	%	
25-35	32	26,6	18	15,8	25	20,8	20	16,7	95	79,2	0,537
36-65	8	6,7	2	4,2	6	5,0	6	5,0	25	20,8	
Smoking	LBP								Total		ρ
	No		**Light**		**Moderate**		**Heavy**				
	n	%	n	%	n	%	n	%	n	%	
No	7	5,8	2	1,7	3	2,5	4	3,3	16	13,3	0,988
Yes	33	27,5	18	15,0	31	25,8	22	18,3	104	86,7	
Sport habits	LBP								Total		ρ
	No		**Light**		**Moderate**		**Heavy**				
	n	%	n	%	n	%	n	%	n	%	
Yes	19	15,8	11	9,2	17	14,2	11	9,2	58	48,3	0,854
No	21	17,5	9	7,5	17	14,2	15	12,5	62	51,7	
Overweight	LBP								Total		ρ
	No		**Light**		**Moderate**		**Heavy**				
	n	%	n	%	n	%	n	%	n	%	
No	28	23,3	16	13,3	28	23,3	23	19,2	95	79,2	0,306
Yes	12	10,0	4	3,3	6	5,0	3	2,5	25	20,8	

Based on Table 2 that the number of LULW respondents, Age 25-35 as many as 95 respondents (79.2%) and age 36-65 as many as 25 respondents (20.8%). Non-smokers accounted for 16 respondents (13.3%) and smoked 104 respondents (86.7%). Not overweight were 95 respondents (79.2%) and overweight were 25 respondents (20.8%). Sports habits was found among 58 respondents (48.3%) and 62 respondents (51.7%) did not have sports habits. Low MMH was 12 respondents (10,0%), while 27 respondents (22,5%) and high were 81 respondents (67,5%). The degree of painless LBP was 40 respondents (33,3%), light pain as much as 20 respondents (16,7%), moderate pain as many as 34 respondents (28,3%) and heavy pain 26 respondents (21,7%).

Table 1 showed that the medium and high MMH with LBP has the highest percenatage (28.3%) and followed by medium and high MMH with no LBP (25.0%). Meanwhile, the sample with the lowest percentage was low MMH with moderate LBP and low MMH with heavy LBP occurences. The statistical test analysis, in Table 2, obtained p value of each variable are: age p=0.537, smoking p=0.988, sport habits p=0.854 and overweight p=0.306. It shows that all confounding variables, there were no significant correlation with low back pain (LBP) occurence.

DISCUSSION

The results of this study indicate that there was a significant relations between Manual Material Handling with Low Back Pain Incidence, where the weight gain MMH tends to have a moderate and severe LBP incidence.The finding is in line with the study of Musdalifah (2014) which found the relationship of Weight Loss Technique with

Low Back Pain (LBP) Complaint on Workers in PT IKI Makassar. South Sulawesi[9]. While, results of Indri's research (2013) showed that there was a significant relationship between Manual Material Handling and Low Back Pain occurrence on textile workers in Surabaya, East Java[10].

The NIOSH stipulation standard specifies Recommended Weight Limit (RWL) and Lifting Index (LI) as a benchmark to ensure that the MMH is not greater than 3.0 so that it does not cause LBP. In reality, however, most of the LULW in the Indonesian archipelago, Kendari, tend to exceed RWL and LI, thus risking in LBP. This is still due to the lack of education and the availability of equipment owned by LULW in the MMH process[11]. It can be concluded that, there was a correlation betweeen manual material handling with low back pain occurence. While there were no correlation of age, smoking, exercise habits, and overweight with low back pain occurence, at LULW, Marine Nusantara Port, Kendari. It is suggested training for manual material handling accurately for health and safety improvement. The advanced research on attitude and work position, psychological factors with low back pain, are needed

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REFFERENCES

1. Basuki, K. “Faktor Risiko Kejadian *Low Back Pain* Operator Tambang Sebuah Perusahaan Nikel Di Sulawesi Tenggara”. Jurnal Promosi Kesehatan, 2009, vol. 4;115-121

2. Mas’idah, E., dkk. Analisis Manual Material Handling (MMH) dengan Menggunakan Metode Biomekanika Untuk Mengidentifikasi Risiko Cedera Tulang Belakang. Skripsi Program Studi Teknologi Industri. Unissula Semarang;2009.

3. Widiyanti, L., *Hubungan Sikap Tubuh Saat Mengangkat dan Memindahkan Pasien Pada Perawat Perempuan dengan Nyeri Punggung Bawah*. Jakarta: Fakultas Kedokteran Universitas Indonesia;2009

4. Jerayatnam, J., dan Kola, D. *Textbook Of Occupational Medicine Practice*. Jakarta: Penerbit Buku Kedokteran ECG;2010.

5. Pratiwi, M. *Beberapa Faktor Yang Berpengaruh Terhadap Keluhan Nyeri Punggung Bawah Terhadap Penjual Jamu Gendon*g. Semarang : Fakultas Kesehatan Masyarakat Universitas Diponegoro;2009.

6. Anonym, *Annual Statistics Report*. London. Health and Safety Executive (HSE). 2012

7. Irma, N.. Identifikasi Elemen-Elemen Lingkungan sebagai Upaya Revitalisasi Kawasan Pantai dan Pelabuhan Kota Lama Kendari”. NALARs;2007.;6,1-16.

8. Anonym, Rekap Kunjungan Poliklinik 2015. Kantor Kesehatan Pelabuhan (KKP) Kendari;2015.

9. Musdalifah, et all. Teknik Angkat Beban Dengan Keluhan Low Back Pain (LBP) Pada Pekerja di PT IKI Kota Makassar. Makassar: Fakultas Kesehatan Masyarakat Universitas Hasanuddin;2014

10. Indri, S. Kajian *Manual Material Handling* Terhadap Kejadian *Low Back Pain* Pada Pekerja Tekstil. Surabaya, Program Studi Kesehatan dan Keselamatan Politeknik Perkapalan Negeri Surabaya;2013.

11. NIOSH. *Ergonomic Guidelines For Manual Material Handling*, 2007. Colombia: DHHS (NIOSH) Publication.