

THE RELATIONSHIP BETWEEN INDIVIDUAL CHARACTERISTICS AND OCCUPATIONAL FACTORS TO LOW BACK PAIN COMPLAINTS AMONG LPG AGENT WORKERS AT MANGGARAI SUBDISTRICT JAKARTA IN 2020***Hubungan Antara Karakteristik Individu Dan Faktor Pekerjaan Terhadap Keluhan Low Back Pain Pada Pekerja Agen LPG Kelurahan Manggarai Jakarta Tahun 2020*****Salma Devita Oktavia¹**¹Universitas Pembangunan Nasional Veteran Jakarta, Indonesia
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/ licenses/by-nc-sa/4.0/)**ABSTRACT**

Based on observations of most of the workers at the LPG agent at Kelurahan Manggarai deploying gas cylinders manually for (\pm 8 hours) and the frequency of activities undertaken by workers is very high, based on interviews conducted by researchers found that most workers experience pain in the lower back. This can increase tension in the muscles and cause disability. This study aimed to determine the relationship between individual characteristics and occupational factors with complaints of low back pain in LPG agent workers at Kelurahan Manggarai Jakarta in 2020. This research was quantitative by using a cross-sectional design. The sampling technique was by total sampling where the number of samples was 52 people. Data were analyzed using the Chi-Square test. Workers' body positions were observed by adjusting the OWAS observation assessment sheet. The results of the analysis found that age, BMI, smoking habits, manual material handling and years of work have a significant relationship with LBP complaints (p-value <0.05), whereas physical activity does not have a significant relationship with LBP complaints (p-values >0.05). The company should create a two-wheeled hand truck based on worker anthropometry to minimize LBP complaints.

Key Words: *Low Back Pain*, LPG Agent, OWAS**ABSTRAK**

Berdasarkan hasil observasi sebagian besar pekerja pada agen LPG Kelurahan Manggarai Jakarta mengerahkan tabung gas secara manual selama kurang lebih 8 jam serta frekuensi aktivitas yang dilakukan pekerja sangat tinggi. Berdasarkan hasil wawancara yang dilakukan peneliti ditemukan sebagian besar pekerja mengalami LBP. Hal ini dapat meningkatkan ketegangan pada otot dan menimbulkan kecacatan. Penelitian ini bertujuan mengetahui hubungan karakteristik individu dan faktor pekerjaan dengan keluhan *low back pain* pada pekerja di agen LPG Kelurahan Manggarai Jakarta tahun 2020. Sebanyak 52 orang dilibatkan dalam penelitian ini dengan menggunakan teknik *total sampling*. Penelitian ini bersifat kuantitatif dengan menggunakan desain *cross-sectional*. Data dianalisis menggunakan uji *Chi-Square*. Posisi tubuh pekerja diamati dengan menyesuaikan lembar penilaian observasi OWAS. Hasil analisis menunjukkan bahwa variabel usia, IMT, kebiasaan merokok, *manual material handling*, dan masa kerja memiliki hubungan yang bermakna dengan keluhan LBP (nilai-p <0,05), sedangkan aktivitas fisik tidak memiliki hubungan yang bermakna dengan keluhan LBP (nilai-p >0,05). Sebaiknya, perusahaan menciptakan *hand truck* dua roda yang dibuat berdasarkan antropometri pekerja agar meminimalisasi terjadinya keluhan LBP.

Kata Kunci: Agen LPG, *Low Back Pain*, OWAS

INTRODUCTION

Humans have physical or non-physical abilities and limitations, while manual deployment is often involved by humans in carrying out their work processes (Evadarianto & Dwiyantri, 2017). A work process that involves human muscles such as lowering, lifting, holding, carrying, pushing, pulling, with one hand or both hands to move the load is called Manual Material Handling (MMH) (Kasjono, Yamtana, & Pandini, 2017). Cases like this can cause musculoskeletal disorders which are often found in work related to muscles and skeleton (Evadarianto & Dwiyantri, 2017). The presence of complaints of low back pain (LBP) is one of the musculoskeletal disorders (Evadarianto & Dwiyantri, 2017). Musculoskeletal complaints begin with muscle fatigue, but usually the feeling of fatigue will disappear after the worker takes a break (Canadian Centre for Occupational Health and Safety, 2014). Since 1990, musculoskeletal conditions have been ranked as the second leading cause of disability in the world (Vos et al., 2017). The Global Burden of Disease 2010 Study revealed that of the 291 diseases studied, the largest contributor to global disability was LBP, as measured by years lived with disability (YLD) (Driscoll et al., 2014). Based on data from the National Health Interview Survey (NHIS) (2009), in the United States the percentage of people with LBP reached 28,5%. For the category of pain that is often experienced by workers, this figure is in the first highest order. The majority of people with LBP in East Asia and Southeast Asia are men aged 35–55 years. This study was conducted in 21 regions of the world and 187 countries (Driscoll et al., 2014). This causes general activities such as walking, getting off the chair, and self-care cannot be done alone (Driscoll et al., 2014). Research conducted in May 2002 by the Indonesian Association of Neurologists (PERDOSSI) on 14 teaching hospitals in Indonesia showed that of the total number of visits by pain patients, 4456 (25%), the number of LBP patients was 819 (18,37%). Sonda (2015) explained that in his research it was known that 91,7% of respondents had a high risk of suffering from LBP in cargo workers. It is estimated that LBP sufferers in Indonesia vary between 7.6% to 37% (Nurindrasari, 2016). It is known from the data on the number of LBP sufferers in Indonesia, it is not

known with certainty. The results of the report of the collaboration between the Research and Development Center for the Humanities and the Health Management of the Indonesian Ministry of Health Balitbangkes with the Institute For Health Metrics and Evaluation (2018), there are five causes of disease in Indonesia which show an increase in the burden of disease, one of which is LBP with an increase of between 15% – 25% (Kemenkes RI, 2018). In the article on safety sign (2018), explained the risk factors that are the main causes of influencing the emergence of Low Back Pain (LBP) or lower back pain in MMH workers, namely individual characteristics and work factors (Safety Sign, 2018).

Complaints of LBP are also often found in workers who do work repeatedly with abnormal body postures. This can increase the tension in the muscles (Santiasih, 2013). Based on the results of observations, most workers deploy gas cylinders manually for (\pm 8 hours) and the frequency of activities carried out by workers is very high. lower back. Complaints of pain experienced by LPG agent workers in Manggarai Village can be one of the causes of the work factor or the individual factor itself. Until now, there has been no research on LBP complaints conducted at LPG agents in Manggarai Village. Therefore, researchers were interested in knowing the relationship between individual characteristics and work factors with complaints of low back pain in workers at LPG agents in Manggarai Village, Jakarta in 2020.

METHOD

This research was conducted on all manual material handling workers at the LPG agent in Manggarai Village in April-June 2020. This study was conducted to determine the relationship between individual characteristics and work factors (manual material handling activities and years of service) with complaints of low back pain (LBP) in worker at LPG agent in Manggarai Village.

This research method was quantitative by using a cross-sectional study design or a cross-sectional study because the problem or disorder being studied was a very common disorder. This study used a sampling technique by total sampling where the number of samples was 52 people. Research data

collection techniques were carried out through observation, interviews, and questionnaires. Meanwhile, to assess the category of worker's

body posture was observed using the OWAS (Ovako Work Analysis System) assessment sheet).

RESULT

Table 1. Frequency Distribution of Respondents to the Variables Studied

Variable	Total (n= 50)	Percentage (%)
LBP Complaint		
No complaint	12	23,1
Complaint	40	76,9
Age		
≤ 34 years old	19	36,5
> 34 years old	33	63,5
Body Mass Index		
Normal	14	26,9
Abnormal	38	73,1
Physical Activities		
Sufficient Physical Activities	31	59,6
Less Physical Activities	21	40,4
Smoking Habit		
No smoking	11	21,2
Light smoker	6	11,5
Moderate smoker	17	32,7
Heavy smoker	18	34,6
Manual Material Handling		
Category 1	9	17,3
Category 2	9	17,3
Category 3	15	28,8
Category 4	19	36,5
Work Time		
<4 years	17	32,7
>4 years	35	67,3

Table 1 showed that some workers have never experienced LBP complaints, as many as 12 workers (23.1%), while 40 workers (76.9%) experienced LBP complaint.

Table 1 showed that the respondents in this study had an average age of 34.15 years by dividing the skewness value in the statistics of 359 and std. error 330 obtained 1.087. The majority of respondents were 34 years old. As many as 19 out of 52 respondents (36.5%), in table 8 were known to have an age of less than 34 years. However, 33 of 52 respondents (63.5%) have an age of more than or equal to 34 years. Based on the results of measurements performed by researchers to workers, it was known that there were 14 workers out of 52 respondents (26.9%) who did not have a risky or normal BMI, while 38 of 52 respondents

(73.1%) have a risky or abnormal BMI. Of the 52 respondents who worked as LPG agents, 31 respondents (59.6%) have sufficient physical activity, 21 respondents (40.4%) have less physical activity. Of the 52 respondents only 11 respondents (21.2%) did not have a smoking habit, 6 respondents (11.5%) had a light smoking habit, 17 respondents (32.7%) had a moderate smoking habit, while respondents who were heavy smokers were only 18 respondents (34.6%). The frequency distribution of work factor variables can be seen in Table 1. It was known that from 52 workers in carrying out manual material handling activities, there were 9 respondents (17.3%) having category 1, 9 respondents (17.3%) having category 2, 15 respondents (28.8%) belong to category 3, while as many as 19 respondents (36.5%) have category 4.

Furthermore, other work factors were years of service, as many as 17 respondents (32.7%) have a work period that was not at risk, which

was less than 4 years , while as many as 35 respondents (67.3%) had a risky working period of more than 4 years.

Table 2. Relationship of Independent Variables with LBP Complaints

Variable	LBP Complaints				Total		P Value
	No complaint		Complaint				
	n	%	n	%	n	%	
Age							
≤ 34 years old	10	52,6	9	47,4	19	100	0,001
> 34 years old	2	6,1	31	93,9	33	100	
Body Mass Index							
Normal	8	57,1	6	42,9	14	100	
Abnormal	4	10,5	34	89,5	38	100	0,001
Smoking Habit							
No smoking	7	63,6	4	36,4	11	100	0,001
Light smoker	2	33,3	4	66,7	6	100	
Moderate smoker	2	11,8	15	88,2	17	100	
Heavy smoker	1	5,6	17	94,4	18	100	
Physical Activity							
Sufficient	10	32,3	21	67,7	31	100	
Less	2	9,5	19	90,5	21	100	0,003
Manual Material Handling							
Category 1	6	66,7	3	33,3	9	100	
Category 2	3	20,0	6	66,7	9	100	0,001
Category 3	3	0,0	12	80,0	15	100	
Category 4	0	23,1	19	100	19	100	
Work Time							
<4 years	9	52,9	8	47,1	17	100	
>4 years	3	8,6	22	91,4	35	100	0,001

Table 2 showed that there was a significant relationship between age (p-value 0.001), smoking habits (p-value 0.001), physical activity (p-value 0.003), MMH activity (p-value 0.001), and work time (p-value 0.001) with complaints of low back pain. Based on the results of the Fisher exact test, it was known that the p-value (> 0.05) is 0.093, then Ho was accepted and Ha is rejected, meaning there was no relationship between the two variables.

DISCUSSION

Analysis of Age Relationship between LBP Complaints

Based on the results of the analysis in this study, it is known that there is a significant relationship between age and complaints of LBP, using the Fisher's Exact Test, a p-value

of less than 0.05 is 0.001. Table 10 shows that the majority of respondents who have LBP complaints are more than 34 years old, as many as 31 respondents (93.9%).

Nurzannah (2015) obtained a p-value of less than 0.05 so that there was a significant relationship between age and LBP complaints in loading and unloading workers. It was similar to Widyasari's research (2014). The r value of 0.400 was obtained where the r value was at 0.400 less than the correlation coefficient. It was also less than 0.599 meaning that means there was a significant relationship between the age of workers and complaints of LBP in the informal business sector tailor at CV. Wahyu Langgeng Jakarta with a sufficient level of relationship. However, in contrast to the results of Wahab's research (2019), there

was no relationship between the age variable and LBP complaints with a p-value of 0.214.

Bone degeneration was followed by an increase in a person's age. This condition began to occur when a person was 30 years old. At the age of 30 years, there was degeneration in the form of tissue damage (Andini, 2015). Therefore, the results of this study were in accordance with the statement above which was known that ages over 34 years have the opportunity to experience LBP complaints.

Analysis of the Relationship between BMI and LBP Complaints

Based on the results of statistical tests using the Fisher's Exact Test, it is known that BMI and LBP complaints have a significant correlation obtained from the results of a p-value less than 0.05, which is 0.001. Table 10 shows as many as 34 of 38 respondents (89.5%) who are included in the Body Mass Index are not normal and have complaints of low back pain. Meanwhile, of the 14 respondents who entered the normal body mass index, only 6 respondents (42.9%) had complaints of low back pain.

This study is in line with research conducted by Widjaya, et al (2014) showing the results that there is a significant relationship between BMI and LBP complaints, it is known that the p-value is 0.011. Research conducted by Rosari (2019) also showed the same result, namely that there was a significant relationship between BMI and complaints of LBP, with a p-value of less than 0.05, i.e. 0.046. This study is not in line with the research conducted by Wahab (2019) which shows that there is no significant relationship between body mass index and complaints of LBP, it is known that the p-value is more than 0.05, namely 0.199.

The results of this study can be said to be in accordance with the theory of Maulana, et al (2016) which states that if a person has excessive body weight, the fat will be channelled to the abdominal area and allow accumulation to occur so that the lumbar work increases to support the load. The increase in weight makes the spine will be more stressed to accept the load. This condition can cause damage and harm to the spinal structure (Maulana, Mutiawati, & Azmunir, 2016).

Analysis of Correlation of Smoking Habits with LBP Complaints

Based on the results of statistical tests on the smoking habit variable, a p-value of 0.003 was obtained, which means a p-value of less than 0.05 indicating a significant relationship between smoking habits and LBP complaints experienced by workers in both LPG agents. The data obtained show that most of the respondents in the two LPG agents have a smoking habit, namely the category of heavy smokers. It can be seen in table 10 that in the smoking habit variable from 18 respondents, 17 respondents (94.4%) were in the category of heavy smokers and had complaints of LBP.

This study is in line with research conducted by Wahab (2019) which shows that there is a significant relationship between smoking habits and complaints of LBP among fishermen in Batu Karas Village. This is evidenced by the p-value less than 0.05 which is 0.021. However, it is different from the research conducted by Nurzannah (2015), which shows that there is no relationship between smoking habits and LBP complaints in loading and unloading workers. This result is based on the p-value which shows more than 0.05 which is 1000.

According to Setyowati, et al (2017), explaining that smoking can cause bones to lack mineral content, causing pain due to fractures/damage to the bones. Nicotine in cigarettes can reduce blood flow to tissues (Setyowati, Widjasena, & Jayanti, 2017). Because the effects that arise from the dangers of smoking are chronic, it is possible that when this research took place, the influence or impact of the dangers of smoking on the respondents, namely experiencing back pain complaints.

Analysis of Correlation between Physical Activity and Complaints of LBP

The results of bivariate analysis using the Fisher's Exact Test obtained a p-value of 0.093 (p value > 0.05) which means that there is no significant relationship between physical activity and complaints of LBP in LPG agent workers in Manggarai Village in 2020. The results of this study are in accordance with research Wahab (2019) which was conducted using the Fisher's Exact Test (p value = 0.861) because the p value > 0.05 then there is no relationship between physical activity and LBP complaints because respondents who do not

have sufficient physical activity have good nutritional status so that the energy needed by the muscles to do work and heavy loads can be fulfilled.

However, it is not in accordance with the research of Nurzannah, et al (2015) which states that there is a significant relationship between physical activity and complaints of LBP (p value = 0.021), which means that the variable of physical activity with complaints of LBP has a significant relationship. Generally, muscle complaints rarely occur in someone who has very sufficient rest time. Conversely, someone who works with exertion that requires great energy and does not have enough time to rest will experience muscle complaints. The absence of a relationship in this study could occur because LPG agent workers with physical activity categories lacked good nutritional status. Thus, the intake of nutrients needed by the muscles to carry out the exertion of heavy loads can be fulfilled.

Analysis of the Relationship between the Material Handling Manual and LBP Complaints

The results of the Chi-Square Test indicate that there is a significant relationship between the MMH variable and LBP complaints. These results were obtained from an assessment carried out using the OWAS method. This method consists of four levels of the scale of work attitudes that are harmful to the respondents.

To determine the category of each work posture, it is then coded and entered into the OWAS work attitude analysis table. Based on table 11 shows that as many as 19 respondents (100.0%) who fall into category 4 and have complaints of LBP, in other words as many as 19 respondents who fall into category 4 have a very dangerous work attitude on the musculoskeletal system, in addition to working posture such as this can lead to clear risks. The work attitude in category 4 needs improvement as soon as possible. Based on the results of this study, recommendations that can be given to minimize the risk of LBP complaints are at the workplace providing a two-wheeled hand truck to reduce the static load experienced by workers and made according to the worker's BMI.

This study is in line with research conducted by Mayasari, et al (2018), suggesting that there is correlation between

MMH and LBP complaints, obtained a p -value of less than 0.05, which is 0.003. In other studies, the majority also stated that there was a relationship between manual exertion activities and complaints of LBP.

Analysis of Correlation between Year of Working and LBP Complaints

The results of the bivariate analysis obtained a p -value of 0.001, then H_0 was rejected, and H_a was accepted, meaning that there was a relationship between tenure and LBP complaints. There were 32 respondents (91.4%) with a working period of more than 4 years and had LBP complaints.

The results of this study are in line with Harahap's research (2018) which shows that there is a significant relationship between tenure and LBP complaints on hand-drawn batik craftsmen in the Pelawangan District in 2018. These results are based on the p -value obtained, which is 0.040. It can also be interpreted that the longer the respondent's working period, the more at risk of experiencing LBP complaints. It is the same with Wahab's research (2019) which shows that tenure is associated with LBP complaints. It is proven from the results of the chi-square test with a p value of 0.031.

Wahab (2019) explained that LBP is a disease that takes a long time to have an impact. Thus, the longer a person is exposed to risk factors due to his work, the greater the level of one's back pain complaints. According to Harwanti (2018), the risk of experiencing LBP complaints will increase along with the length of a person's working period and supported by non-ergonomic working conditions that can put pressure on the spinal disc (intervertebral disc) which can thin out or even tear over time. which will trigger the emergence of LBP in workers.

To reduce the impact of LBP complaints, it is recommended for workers to take preventive measures by taking adequate rest or arranging special rest periods to prevent fatigue.

CONCLUSION

Of the 52 respondents, there were 12 workers (23.1%) who had never experienced LBP complaints, while 40 workers (76.9%) years had experienced LBP complaints.

The highest proportion of the age variable is in respondents who are more than

34 years old, as many as 33 respondents (63.5%). The highest BMI variable is in the abnormal category as many as 38 respondents (73.1%). The highest physical activity variable was in the sufficient physical activity category, as many as 31 respondents (59.6%). The highest smoking habit variable is in the light smoker category, which is as many as 29 respondents (11.5%).

The highest MMH variable is in category 4 as many as 19 respondents (36.5%). In the variable of tenure, the highest percentage is in the category of long service period, namely as many as 35 respondents (67.3%).

There is a relationship between the variables Age, BMI, smoking habits with the incidence of complaints of low back pain in workers at the LPG agent in Manggarai Village, Jakarta in 2020. There is no relationship between Physical Activity and the incidence of complaints of low back pain in workers at the LPG agent, Manggarai Village, Jakarta in 2020.

There is a relationship between manual material handling activities and years of service with the incidence of complaints of low back pain among workers at LPG agents in Manggarai Village, Jakarta in 2020.

REFERENCES

Canadian Centre for Occupational Health and Safety. (2014). Work-related Musculoskeletal Disorders (WMSDs): OSH Answers.

Driscoll, T. R., Jacklyn, G., Orchard, J., Passmore, E., Vos, T., Freedman, G., ... Punnett, L. (2014). The Global burden of occupationally related low back pain: estimates from the Global Burden of Disease 2010 study. *Annals of the Rheumatic Disease*, 73(6), 975–981. <https://doi.org/10.1136/annrheumdis-2013-204631>

Evadarianto, N., & Dwiyaniti, E. (2017). Postur Kerja Dengan Keluhan Musculoskeletal Disorders Pada Pekerja Manual Handling Bagian Rolling Mill. *The Indonesian Journal Of Occupational Safety and Health*, 6(1), 97–106. Diambil dari e-journal.unai.ac.id

Kasjono, H. S., Yamtana, & Pandini, D. I. (2017). Faktor Risiko Manual Handling dengan Keluhan Nyeri Punggung Bawah Pembuat Batu Bata. *Jurnal Kesehatan*, VIII, 202–212.

Kemendes RI. (2018). Analisis Beban Penyakit Nasional Dan SUB Nasional Indonesia 2017. Diambil 3 Maret 2020, dari Badan Penelitian dan Pengembangan Kesehatan, Kemendes RI website: https://dinkes.acehprov.go.id/uploads/laporan_BoD20172.pdf

Maulana, R. S., Mutiawati, E., & Azmunir. (2016). Hubungan Indeks Massa Tubuh (IMT) Dengan Tingkat Nyeri Pada Penderita Low Back Pain (LBP) Di Poliklinik Saraf RSUD Dr. Zainoel Abidin Banda Aceh. *Jurnal Ilmiah Mahasiswa Kedokteran Biomedis*, 1(November), 1–6.

Nurindrasari. (2016). *Gambaran Kejadian Low Back Pain Pada Pegawai Rektorat UIN Alauddin Makassar*. Makassar.

Safety Sign. (2018). Cegah Cedera, Pekerja Harus Pahami Panduan Manual Material Handling (MMH) Yang Benar. *Safety Sign Indonesia*. Diambil dari <https://www.safetysign.co.id/news/369/Cegah-Cedera-Pekerja-Harus-Pahami-Panduan-Manual-Material-Handling-MMH-yang-Benar>

Santiasih, I. (2013). Kajian Manual Material Handling Terhadap Kejadian Low Back Pain Pada Pekerja Tekstil. *TI UnDip*, VIII. <https://doi.org/10.12777/jati.8.1.21-26>

Setyowati, Widjasena, B., & Jayanti, S. (2017). Hubungan Beban Kerja, Postur Dan Durasi Jam Kerja Dengan Keluhan Nyeri Leher Pada Porter Di Pelabuhan Penyeberangan Ferry Merak-Banten. *Jurnal Kesehatan Masyarakat*, 5(2).

Vos, T., Abajobir, A. A., Abbafati, C., Abbas, K. M., Abate, K. H., Abd-Allah, F., ... Murray, C. J. L. (2017). Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries,

- 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, 390(10100), 1211–1259. [https://doi.org/10.1016/S0140-6736\(17\)32154-2](https://doi.org/10.1016/S0140-6736(17)32154-2)
- Canadian Centre for Occupational Health and Safety. (2014). Work-related Musculoskeletal Disorders (WMSDs) : OSH Answers.
- Driscoll, T. R., Jacklyn, G., Orchard, J., Passmore, E., Vos, T., Freedman, G., ... Punnett, L. (2014). The Global burden of occupationally related low back pain: estimates from the Global Burden of Disease 2010 study. *Annals of the Rheumatic Disease*, 73(6), 975–981. <https://doi.org/10.1136/annrheumdis-2013-204631>
- Evadariato, N., & Dwiyaniti, E. (2017). Postur Kerja Dengan Keluhan Musculoskeletal Disorders Pada Pekerja Manual Handling Bagian Rolling Mill. *The Indonesian Journal Of Occupational Safety and Health*, 6(1), 97–106. Diambil dari e-journal.unai.ac.id
- Kasjono, H. S., Yamtana, & Pandini, D. I. (2017). Faktor Risiko Manual Handling dengan Keluhan Nyeri Punggung Bawah Pembuat Batu Bata. *Jurnal Kesehatan*, VIII, 202–212.
- Kemenkes RI. (2018). Analisis Beban Penyakit Nasional Dan SUB Nasional Indonesia 2017. Diambil 3 Maret 2020, dari Badan Penelitian dan Pengembangan Kesehatan, Kemenkes RI website: https://dinkes.acehprov.go.id/uploads/laporan_BoD20172.pdf
- Maulana, R. S., Mutiawati, E., & Azmunir. (2016). Hubungan Indeks Massa Tubuh (IMT) Dengan Tingkat Nyeri Pada Penderita Low Back Pain (LBP) Di Poliklinik Saraf RSUD Dr. Zainoel Abidin Banda Aceh. *Jurnal Ilmiah Mahasiswa Kedokteran Biomedis*, 1(November), 1–6.
- Nurindrasari. (2016). *Gambaran Kejadian Low Back Pain Pada Pegawai Rektorat UIN Alauddin Makassar*. Makassar.
- Safety Sign. (2018). Cegah Cedera, Pekerja Harus Paham Panduan Manual Material Handling (MMH) Yang Benar. *Safety Sign Indonesia*. Diambil dari <https://www.safetysign.co.id/news/369/Cegah-Cedera-Pekerja-Harus-Paham-Panduan-Manual-Material-Handling-MMH-yang-Benar>
- Santiasih, I. (2013). Kajian Manual Material Handling Terhadap Kejadian Low Back Pain Pada Pekerja Tekstil. *TI UnDip*, VIII. <https://doi.org/10.12777/jati.8.1.21-26>
- Setyowati, Widjasena, B., & Jayanti, S. (2017). Hubungan Beban Kerja, Postur Dan Durasi Jam Kerja Dengan Keluhan Nyeri Leher Pada Porter Di Pelabuhan Penyeberangan Ferry Merak-Banten. *Jurnal Kesehatan Masyarakat*, 5(2).
- Vos, T., Abajobir, A. A., Abbafati, C., Abbas, K. M., Abate, K. H., Abd-Allah, F., ... Murray, C. J. L. (2017). Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, 390(10100), 1211–1259. [https://doi.org/10.1016/S0140-6736\(17\)32154-2](https://doi.org/10.1016/S0140-6736(17)32154-2)