www.bircu-journal.com/index.php/birci
Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
Budapest Institute

The Effect of Changes in Work Patterns and Sleep Quality on Regular Workers of Pertamina Up Stream Energy West Madura Offshore (PHE 5 WMO) on Complaints of Physical and Mental Work Examination

Van Satrio Wibowo[1], Indriati Paskarini[2]
[1]*Master of Occupational Health and Safety Study Program, Faculty of Public Health, Universitas Airlangga, Indonesia*
[2]*Faculty of Public Health, Universitas Airlangga, Indonesia*
van.satrio.wibowo-2020@fkm.unair.ac.id, indriati.paskarini@fkm.unair.ac.id

Abstract

8 out of 10 employees of Pertamina Hulu Energi 5 West Madura Offshore (PHE 5 WMO) have complaints of difficulty in concentration. These complaints were felt by the workers since there was a change in work patterns from 2 weeks of work and 2 weeks off to 4 working weeks and 4 weeks off. The purpose of this study was to analyze the factors that influence complaints of physical and mental work fatigue due to changes in work patterns in regular PHE 5 WMO workers. This study is a sectional technique of Stratified Random Sampling sampling 67 workers. The variables in this study were age, sleep quality, and complaints of physical and mental work fatigue. Individual characteristic data was obtained using a questionnaire. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. Complaints of physical and mental work fatigue were measured using the Industrial Fatigue Research Committee of the Japanese Association of Industrial Health (IFRC Japan) questionnaire. Data were analyzed by a logistic regression test. obtained a regression coefficient of 1.896 with a Wald value of 7.278 and a significance value of 0.007. These results show a significance value of less than 0.05 (sig < 0.05) so that it is stated that there is a significant influence between sleep quality on complaints of physical and mental fatigue, meaning that the worse sleep quality will have a significant effect on the higher complaints of physical and mental fatigue.

Keywords
work patterns; sleep quality; physical and mental work examination

I. Introduction

Occupational Health and Safety (K3) is a program created by a company to prevent work-related accidents and occupational diseases by analyzing a job that has the potential to cause work-related accidents and diseases and can take action in the event of accidents and occupational diseases. The purpose of Occupational Safety and Health (K3) is to provide comfort and security to workers so that they can make workers increase their work productivity and can minimize the risk of accidents and occupational diseases (Friend and Kohn, 2007).

One of the K3 (Occupational Health and Safety) problems that can trigger work accidents is fatigue. Work fatigue is a condition of decreased efficiency and endurance of a person in work.1 The term fatigue refers to a weakening condition of the workforce to carry out an activity, resulting in a reduction in work capacity and body resistance. According to the International Labor Organization (2003) every year there are work

accidents that result in the death of as many as two million workers, this is due to fatigue. In this study, it was stated that 32.8% of the total sample suffered from fatigue. The nature of fatigue for everyone is subjective because it is influenced by several factors that need special attention as a follow-up so that there are no problems with the health of workers so that it does not have an impact on decreasing work productivity (Sedarmayanti, 2009).

Fatigue plays a major role in all industrial sectors in terms of performance, safety and productivity. And this fatigue case is always in the top 5 problems due to human factors from year to year (Lerman et al., 2012). The oil and gas sector is one of the sectors with the most regulated safety standards and regulations, but mortality in this sector is still very high, especially when compared to other employment sectors (McLaughlin and Sherouse, 2016). The death rate in the oil and gas sector is seven times higher than in other employment sectors (Bureau of Labor Statistics, 2016).

It is estimated that burnout costs more than 18 billion dollars per year due to lost productivity alone, of which 84% is due to decreased performance, rather than attendance figures (Caruso, 2014). Fatigue problems in the oil and gas sector have a very large impact, especially in terms of work safety. An example is the incident in the city of Texas in 2005, which resulted in the death of 15 workers, 180 injuries, and a loss of at least $1.5 billion. Fatigue was identified as a contributing factor as some operators had worked 12-hour shifts for 29 days without a break (CSB, 2007). It is estimated that up to 80% of industrial accidents are caused by human error, where fatigue is often a contributing factor (Theophilus et al., 2017).

Factors causing fatigue in the oil and gas sector may occur due to the dynamic environmental conditions of the oil and gas sector, including high physical and mental workloads, coupled with long working periods, shift work and prolonged social isolation. The disproportionate mortality rate in this industry can be caused by a complex combination and interaction of factors that contribute to high levels of fatigue (Gardner, 2010).

On December 31, 2019, the WHO China Country Office reported a case of pneumonia of unknown etiology in Wuhan City, Hubei Province, China. On January 7, 2020, China identified pneumonia of unknown etiology as a new type of coronavirus (coronavirus disease, COVID-19). On January 30, 2020 WHO declared it a Public Health Emergency of International Concern (KKMMD/PHEIC). The addition of the number of cases of COVID-19 took place quite quickly and there had been spread between countries (Coronavirus Disease Prevention and Control Guidelines, 2020).

Therefore, in order to assist the government in controlling the spread of the COVID-19 virus, a change in the work pattern at PHE5 WMO was made, one of which was by implementing a work schedule from 14 working days 14 days off to 28 working days 28 days off. The decision is contained in the PHE WMO Memorandum regarding Changes in Work Schedules for PHE WMO Workers during the COVID-19 Pandemic which was signed by the General Manager of PHE WMO.

II. Research Method

This research is an observational, analytic, and cross sectional research. Research samples in this study were regular employees of Pertamina Hulu Energi 5 West Madura Offshore (PHE 5 WMO) with Stratified Random Sampling , namely 67 people.

2.1 Collection Techniques

Primary data were obtained through a subjective sleep quality test questionnaire, namely the Pittsburgh Sleep Quality Index (PSQI) questionnaire, a subjective self-rating test (Subjective Self Rating Test) questionnaire, namely the Industrial Fatigue Research Committee of the Japanese Association of IndustrialHealth (IFRC Japan). Secondary data obtained from data on the number of employees, archive records and all company documentation related to research materials.

2.2 Data Processing Data

Processing in this study begins with the collection of raw data (1), at this stage all data, both primary and secondary data, are collected. Next is data checking (2), data checking is carried out to check the accuracy and completeness of the research file. After that the scoring stage (3), at the scoring stage it was carried out on variables using a Likert scale questionnaire such as responsibilities and complaints of physical and mental fatigue. Then the assessment is carried out by determining the score or value of the respondent's answers, with the highest value to the lowest value of the proposed questionnaire. Tabulating (4), is compiling data with a laptop to facilitate the process of data analysis, such as compiling data in tables according to the variables studied. Measurement of variables (5), (a) sleep quality: measurement of sleep quality/sleep time for regular employees of Pertamina Hulu Energi 5 West Madura Offshore (PHE 5 WMO) using the Pittsburgh Sleep Quality Index questionnaire which aims to determine a person's sleep quality subjectively for 1 year. In the last month, PSQI has had 18 questions that form the 7 components of the assessment. The final assessment of the PSQI obtained the final result in the form of a sleeping index, which was obtained by filling out the PSQI questionnaire with a certain weighting. Through this index, it can be seen how good a person's sleep quality is and vice versa. Measurement of variables, (b) complaints of physical and mental work fatigue: measuring complaints of mental fatigue on regular employees of Pertamina Hulu Energi 5 West Madura Offshore (PHE 5 WMO) using the Industrial Fatigue Research Committee of the Japanese Association of Industrial Health (IFRC Japan) questionnaire. This questionnaire consists of 3 aspects and 30 questions. The time for filling out the questionnaire is done by workers when they finish work on that day in the third week of the end or the beginning of the fourth week. Furthermore, the sum of the results of the total scores on the Japanese IFRC questionnaire will be carried out using an interval scale with three measurement scales. Categorization of results (6), categorization of results is made based on the minimum score to the maximum score which is then categorized from the lowest or highest category.

2.3 Data Analysis

in this study will be analyzed statistically using ordinal logistic regression test to connect numerical variables with categorical if the numeric variables are normally distributed with a degree of significance p value < 0.05 which means there is a statistically significant relationship and if p value > 0 ,05 means that there is no statistically significant relationship.

Descriptive analysis was carried out on each variable from the results of the study using a frequency distribution table so as to produce the distribution and percentage of each research variable.

III. Results and Discussion

3.1 Physical and Mental Work Fatigue Complaints of Regular Workers PHE 5 WMO

Table 1. Complaints of Physical and Mental Work Fatigue from Each Division of Work for Regular Workers PHE 5 WMO

Work Division	Work Fatigue						Total	
	Low		Medium		High			
	n	%	n	%	n	%	n	%
Production	27	40.3	21	31.3	2	3	50	74.6
Maintenance	9	13.4	8	11.9	0	0	17	25.4
Total	36	53.7	29	43.2	2	3	67	100

Source: Primary Data (2022)

From Table 1, it is known that the majority of Regular PHE 5 WMO workers experience complaints of low category physical and mental fatigue as many as 36 workers or 53.7% of the number of regular PHE 5 WMO workers. The majority of workers experience physical and mental fatigue in the moderate category as many as 29 workers or 43.2%. The majority of workers experience complaints of physical and mental fatigue in the high category as many as 2 workers or 3%. The results were dominated by workers from the *Production division.*

3.2 Age Distribution of Regular Workers PHE 5 WMO

Table 2. Age of Regular Workers PHE 5 WMO

No.	Age	Total (employees)	Percentage
1.	20 – 35 years	31	42.3
2.	36 – 45 years	22	32.6
3.	46 – 60 years	14	25.1
Total		67	100

Source: Primary Data (2022)

Known regular PHE workers 5 WMOs aged 20-35 years were 31 workers or 42.3%, for the number of workers aged 36-45 years were 22 workers or 22%, and for the number of workers aged 46-60 years were 14 workers or 25.1%.

3.3 Distribution of Sleep Quality for Regular Workers PHE 5 WMO

Table 3. Sleep Quality for Regular Workers PHE 5 WMO

No.	Sleep Quality	Number (workers)	Percentage
1.	Good	18	26.9
2.	Poor	49	73.1
Total		67	100

Source: Primary Data (2022)

From Table 3 it is known that the majority of regular PHE 5 WMO workers have good sleep quality, as many as 18 workers or 26.9%, for the number of workers with poor sleep quality as many as 49 workers or 73.1%. Workers with poor sleep quality are mostly from Production.

3.4 The Effect of Changes in Work Patterns and Sleep Quality on PHE 5 WMO Regular Workers on Complaints of Physical and Mental Work Fatigue

Table 4. Logistics Regression Test Results Based on the *Pittsburgh Sleep Quality Index* (PSQI)

		Estimate	Std. Error	Wald	df	Sig.
Threshold	[FisMen = 1]	3,932	1,806	4,739	1	FisMen
	= 2]	7,613	2,012	14,321	1	.000
Location	Age	-.979	.423	5,368	1	1.896
	Sleep Quality	.703	0.021	7.278	1	0.007

Source: Processing Results with IBM SPSS (2022)

The results of testing the effect of changes in work patterns and sleep quality on PHE 5 WMO regular workers on complaints of physical and mental work fatigue based on the results of a questionnaire using logistic regression showed that there was a significant effect between age and sleep quality on the incidence of complaints of physical and mental work fatigue Between age and complaints of physical and mental fatigue, the regression coefficient is -0.979 with a Wald value of 5.386 and a significance value of 0.021. These results show a significance value of less than 0.05 (sig < 0.05) so that it is stated that there is a significant influence between age on complaints of physical and mental fatigue, meaning that increasing age will have a significant effect on the higher complaints of physical and mental fatigue.

The effect of sleep quality on complaints of physical and mental fatigue is obtained by a regression coefficient of 1.896 with a Wald value of 7.278 and a significance value of 0.007. These results show a significance value of less than 0.05 (sig < 0.05) so that it is stated that there is a significant influence between sleep quality on complaints of physical and mental fatigue, meaning that the worse sleep quality will have a significant effect on the higher complaints of physical and mental fatigue.

IV. Conclusion

1. In order to assist the government in controlling the spread of the COVID-19 virus, a change in work patterns at PHE5 WMO was carried out, one of which was by implementing a work schedule from 14 working days 14 days off to 28 working days 28 days off. The decision was contained in the PHE WMO Memorandum regarding Changes in Work Schedules for PHE WMO Workers during the COVID-19 Pandemic, which was signed by the General Manager of PHE WMO.
2. PHE 5 WMO regular workers who experience complaints of physical and mental work fatigue in the low category are 36 workers (53.7%). The majority of workers who experience fatigue are in the moderate category as many as 29 workers (43.2%). For the majority of workers who experience complaints of work fatigue in the high category as many as 2 workers (3%). The results were dominated by workers from the Production.
3. There is a significant effect between age on complaints of physical and mental fatigue, meaning that the increasing age will have a significant effect on the higher complaints of physical and mental fatigue.
4. There is a significant influence between sleep quality on complaints of physical and mental fatigue, meaning that the worse the quality of sleep will have a significant effect on the higher complaints of physical and mental fatigue.

References

Bureau of Labour Statistics, 2016, *Number of Fatal Occupational Injuries by Selected Worker and Case Characteristics*, Bureau of Labor Statistics: Washington, DC, USA.

Caruso, C.C, 2014, *'Negative impacts of shiftwork and long work hours'*, *Rehab. Nur*, vol.39, no.1, hh 16-25.

Civil Service Bureau, 2007, *BP Texas City Final Investigation Report*, U.S. Chemical Safety and Hazard Investigation Board: Washington, DC, USA.

Direktorat Jenderal Pencegahan dan Pengendalian Penyakit 2020, *Pedoman Pencegahan dan Pengendalian Coronavirus Diseas (COVID-19), Edisi Revisi ke 4*, Kementerian Kesehatan RI, Jakarta.

Friend M.A & Kohn J.P 2007, *Fundamental of Occupational Safety and Health*, Fourth edition, Government Institutes, Lanham.

Gardner, R 2003, *'Overview and characteristics of some occupational exposures and health risks on offshore oil and gas installations'*, *Annals Occup. Hyg*, vol. 47, hh 201–210.

Helam H. J., dkk. 2017. Analisis Sistem Kerja Shift Terhadap Tingkat Kelelahan Dan Pengukuran Beban Kerja Fisik Perawat RSUD Karanganyar. Jurnal Performa. Vol. 16, No. 1: 44-53

Jalu R. N., dkk, 2019, Hubungan Beban Kerja Fisik, Frekuensi Olahraga, Lama Tidur, Waktu Istirahat Dan Waktu Kerja Dengan Kelelahan Kerja, Jurnal Kesehatan Masyarakat, Vol. 7, No. 1

Lerman, S, Eskin, E, Flower, D, George, E.C, Gerson, B, Hartenbaum, N, Hursh, S.R & Moore-Ede, M 2012, *'Fatigue risk management in the workplace', J. Occup. Environ. Med*., vol. 54, hh. 231–258.

McLaughlin, P.A. & Sherouse, O 2016, *The Impact of Federal Regulation on the 50 States*; George Mason University: Fairfax, VA, USA.

Mehta, R.K 2017, *'Addressing Worker Fatigue Issues in the Oil and Gas Extraction Industry'*, American Society of Safety Engineers, ASSE Professional Development Conference and Exposition, USA.

Nurmianto E 2003, *Ergonomi Konsep Dasar dan Aplikasinya, Universitas Diponegoro*, Semarang.

Parkes, K.R 2012, *'Shift schedules on North Sea oil/gas installations: A systematic review of their impact on performance, safety and health'*. *Saf. Sci.*, vol.7, hh.1636–1651.

Sedarmayanti 2009, *Sumber Daya Manusia dan Produktivitas*, CV Mandar Maju, Bandung.

Setyawati 2006, '*Relation between feeling of fatigue, reaction time, and work productivity'*, Journal of Human Ergonomic, vol. 24, hh, 129-135.

Shortz, A.E, Mehta R.K, Peres S.C, Benden M.E & Zheng Q 2019, *'Development of the Fatigue Risk Assessment and Management in High-Risk Environments (FRAME)', Int. J. Environ. Res. Public Health*, vol. 522, hh. 522.

Sneddon, A, Mearns, K & Flin, R 2013, '*Stress, fatigue, situation awareness and safety in offshore drilling crew', Saf. Sci*., vol. 56, hh. 80.

Suma'mur 2009, *Higiene Perusahaan dan Kesehatan Kerja*, Gunung Agung, Jakarta.

Tarwaka 2010, *Ergonomi Industri Dasar Dasar Pengetahuan Ergonomi dan Aplikasi di Tempat Kerja*, HARAPAN PRESS, Surakarta.

Tarwaka, Solichul HA, Bakri dan Sudiajeng L 2004, *Ergonomi Untuk Keselamatan, Kesehatan Kerja dan Produktivitas*, UNIBA PRESS, Surakarta.

Tesha D. A. A., Julian D. S., 2020, Hubungan Antara Waktu Kerja Dan Beban Kerja Fisik Dengan Perasaan Kelelahan Pada Pekerja Di Home Industri Tahu Di Dukuh Janten, Jurnal Kesehatan Masyarakat, Vol.2, No. 1

Theophilus, S.C, Esenowo, V.N, Arewa, A.O, Ifelebuegu, A.O, Nnadi, E.O & Mbanaso, F.U 2017*, 'Human factors analysis and classification system for the oil and gas industry (HFACS-OGI)', Reliab, Eng, Syst. Saf,* vol. 167, hh. 168–176.

Viska D. C. K., Endang D., 2017, Hubungan Stres Kerja dengan Kelelahan pada Perawat dengan Metode Pengukuran DASS 21 dan IFRC, Jurnal Ilmiah Kesehatan Media Husada, Vol. 6, No. 1

Wahyu K., Suroto, Ekawati. 2017. Analisis Hubungan Beban Kerja Fisik, Masa Kerja, Usia, Dan Jenis Kelamin Terhadap Tingkat Kelelahan Kerja Pada Pekerja Bagian Pembuatan Kulit Lumpia Di Kelurahan Kranggan Kecamatan Semarang Tengah. Jurnal Kesehatan Masyarakat. Vol.5

Wignjosoebroto S 2000, *Ergonomi Studi Gerak dan Waktu*, Institut Teknologi Surabaya, Penerbit Guna Widya, Surabaya.