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Dyslipidemia Factors on Male Workers at Power Plant in Jepara

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ABSTRACT

According to WHO data 2021 that 41 million people died every year in the world caused by non-communicable diseases or equivalent to 71% of death globally and more than 15 million people who died from non-communicable diseases were aged between 30-69 years. The biggest contributor to death from non-communicable diseases in the world is cardiovascular disease which is up to 17.9 million people every year. Atherosclerosis is the basis of heart disease and blood vessels where dyslipidemia is one of its main risk factors. Based on Riskesdas data in 2018, it was found that the prevalence of dyslipidemia case in Indonesia is quite worrying where 28.8% of population aged 15 years old and more had total cholesterol level above 200 mg/dL; 24.3% has HDL level less than 40 mg/dL; 73.8% had LDL level above 100 mg/dL and 27.09% had triglyceride level above 150 mg/dL. The objective of this study was to identify and analyze factors such as age, body mass index/BMI and work status which have a relationship with the incidence of dyslipidemia so that the incidence of dyslipidemia can be prevented. This study was conducted in the one of power plant operation and maintenance company in Jepara Regency where 84.55% of male workers experienced dyslipidemia incidents based on medical check-up results in 2021. The design used in this study was an observational analytic with cross-sectional design. The population in this study was 220 male workers of that company which this study used a total population sampling technique. Data processing was carried out with Chi-Square and Z-test statistical tests. Data obtained that 186 of 220 male workers of that company with dyslipidemia incidence. The results of the study showed that there was a significant relationship between the incidences of dyslipidemia in male workers with their age (p=0.002) and body mass index/BMI which 129 male workers have obesity (p=0.001) and there was no relationship between dyslipidemia incidence by male workers with work status (p=0.505). According to this study, the company needs to initiate health/fitness programs for workers and improve health promotion programs, especially about health lifestyle topics.

Keywords: dyslipidemia; male workers; risk factors

INTRODUCTION

Background

Nowadays in Indonesia, there is a shift in the pattern of disease cases where non-communicable diseases, particularly heart and blood vessel disease (cardiovascular) have increased, although many cases of infectious diseases have not been handled optimally. Several infectious diseases based on Riskesdas data 2018 showed a decrease in prevalence compared to Riskesdas data in 2013 such as acute respiratory infection decreased from 13.8% in 2013 to 4.4% in 2018, malaria decreased from 1.4% in 2013 to 4.4% in 2018 and diarrhea decreased from 18.5% in 2013 to 12.3% in 2018. However pulmonary tuberculosis cases were not a shift in prevalence, 0.4% and pneumonia cases increased in prevalence from 1.6% in 2013 to 2% in 2018[(1)]. Meanwhile, non-communicable diseases such as hypertension, coronary heart disease, and chronic kidney failure based on Riskesdas data in 2018 tend to increase[(2)]. Riskesdas data in 2018 showed that the prevalence of hypertension case increased to 34.1% from 25.8% in 2013 as well as chronic kidney failure increased from 0.2% in 2013 to 0.38% in 2018 while coronary heart disease the prevalence constant (2013-2018) were 1.5%[(2)].

Based on Minister of Health Regulations No. 71 of 2015, non-communicable diseases are the disease that not be able to be transmitted from person to person, runs slowly over a long time/chronic[3] and it is a combination of genetic, physiological, environmental, and behavioral factors[4]. According to WHO data 2021 showed that 41 million people died every year in the world caused by non-communicable diseases or equivalent to 71% of death globally. More than 15 million people who died from non-communicable diseases were aged between 30-69[4]. The biggest contributor to death from non-communicable diseases in the world is cardiovascular disease which is up to 17.9 million people every year[4]. Atherosclerosis is the basis of heart disease and blood vessels whereas dyslipidemia is one of the main risk factors[5].

Dyslipidemia is a metabolic disorder of fatty substances in the blood which is characterized by a decrease or increase in fat levels in the blood. Abnormalities in the fraction of fat levels in the blood include increased levels of fat/cholesterol, LDL (Low-Density Lipoprotein), and triglycerides as well as decreased levels of HDL (High-Density Lipoprotein)[5]. Dyslipidemia is characterized by increased levels of total cholesterol (≥200 mg/dL), LDL (Low-Density Lipoprotein) (≥130 mg/dL), and/or triglycerides (≥150 mg/dL) also decreased levels of HDL (High-Density Lipoprotein) (<35 mg). /dL)[6,7]. Dyslipidemia is an abnormality in blood lipids which have an important role in the incidence of atherosclerosis in blood vessel walls which is the cause of stroke and coronary heart disease[5]. Based on Riskesdas data in 2018, it was found that the prevalence of dyslipidemia case in Indonesia is quite worrying where 28.8% of population aged 15 years old and more had total cholesterol level above 200 mg/dL; 24.3% has HDL level less than 40 mg/dL; 73.8% had LDL level above 100 mg/dL and 27.09% had triglyceride level above 150 mg/dL[8]. Dyslipidemia can be affected by two types of factors, non-modifiable factors such as age, gender, etc, and modifiable factors such as low-fiber and high-fat diet and lack of physical activity and others[9].

This study was conducted in the one of power plant operation and maintenance company (PLTU) in Jepara Regency, Central Java. Based on the results of a medical check-up (MCU) that was conducted on all workers in 2021, it was found that 220 male workers in the company, 186 (84.55%) of them experienced dyslipidemia. This can be interpreted that occurrences number of male workers in the company who experienced dyslipidemia is a very important health problem to be handled so that it does not have an impact on health status of these workers' productivity and company development. Considering that PLTU is one of the national vital objects that supply the electricity in Java-Bali-Madura, it is necessary to know risk factors such as age, body mass index/BMI, and type of work related to the incidence of dyslipidemia so that workers know the right way to prevent the incidence of dyslipidemia and have optimal health and good work productivity.

Purpose

The objective of this study was to identify and analyze factors such as age, body mass index/BMI, and work status which relationship to the incidence of dyslipidemia so that the incidence of dyslipidemia can be prevented.

METHODS

The type used in this study was an observational analytic with a cross-sectional design. This study was conducted in the one of power plant operation and maintenance company (PLTU) in Jepara Regency, Central Java. The population in this study was 220 male workers of that company which this study used a total population sampling technique and 186 of them experienced dyslipidemia. Data collection of this study is secondary data, from medical check-up (MCU) in 2021 which includes age, body mass index (BMI), and work status (shift or non-shift) of male workers. The dyslipidemia classification of respondents was carried out based on The Third National Cholesterol Education Program Adult Treatment Panel / NCEP ATP III in 2001, if they experienced at least 1 of 4 abnormalities such as total cholesterol ≥200 mg/dL; Triglycerides ≥150 mg/dL; LDL cholesterol ≥130 mg/dL and HDL cholesterol<40 mg/dL. Workers can be declared not to have dyslipidemia if the parameters of lipids in their blood are normal[7].

This study to determine the body mass index (BMI) using the standards from the Asia-Pacific Guidelines with the categories BMI <18.5 is underweight; BMI 18.5-22.9 is normal weight; BMI 23-24.9 is overweight and BMI >25 is considered obesity[10]. While the type of work is classified by the difference in working time, shift and non-shift. Shift workers are defined as workers who work in the morning, afternoon, and evening with a working time of 8 hours/day (morning shift: 07:00-15:00, afternoon shift: 15:00-23:00, and night shift: 23:00-07:00) and for workers who have normal hours from 7:30-16:30 categorized as non-shift workers.

The objective of this study was to identify and analyze factors such as age, body mass index/BMI, and work status which have a relationship with the incidence of dyslipidemia, so in this study using the statistical test with the independent variable, age of the worker using the Z-test then variable body mass index (BMI) and employment status/work status using the Chi-Square test and the dependent variable is male workers experienced dyslipidemia.

RESULTS

The subject in this study were all male workers in the one of power plant operating and maintenance company in Jepara Regency which had a medical check-up in 2021 with total 220 workers. Based on table 1, data shows that the most age range of male workers is between the age range of 41-46 years (25.45%), 65% of male workers have a body mass index above 25 (>25) which is category obesity, and 59.55% of the work status are non-shift workers.

Table 1. Characteristics of Male Workers in the Power Plant Operation and Maintenance Company in Jepara Regency Based on Medical Check-Up Results 2021

Variable	Categories	Quantity	Percentage
Age	23-28	47	21.36
	29-34	20	9.09
	35-40	47	21.36
	41-46	56	25.45
	47-52	39	17.73
	53-58	10	4.55
	59-64	1	0.46
Body mass index/ BMI	<18.5 (underweight)	7	3.18
	18.5-22.9 (normal)	28	12.73
	23-24.9 (overweight)	42	19.09
	>25 (obesity)	143	65.00
Work status	Shift	89	40.45
	Non-shift	131	59.55

Table 2 showed that there was a relationship between the age of male workers with the incidences of dyslipidemia based on medical check-up 2021 (p=0.002).

Table 2. The relationship between the age of male workers with the incidence of dyslipidemia based on medical check-up

Age	The Incidence Dyslipidemia				Total		p
	Dyslipidemia		Normal		Frequency	Percentage	
	Frequency	Percentage	Frequency	Percentage			
23-28	32	68.08	15	31.91	47	100.00	0.002
29-34	14	70.00	6	30.00	20	100.00	
35-40	44	93.62	3	6.38	47	100.00	
41-46	54	96.43	2	3.57	56	100.00	
47-52	33	84.62	6	15.38	39	100.00	
53-58	9	90.00	1	10.00	10	100.00	
59-64	0	0.00	1	100.00	1	100.00	

Based on Table 3 it was found that there was a relationship between the body mass index (BMI) of male workers and the incidence of dyslipidemia based on medical check-up 2021 (p=0.001).

Table 3. The relationship between body mass index (BMI) of male workers and the incidence of dyslipidemia based on medical check-up

BMI	Dyslipidemia Incidence				Total		p
	Dyslipidemia		Normal		Frequency	Percentage	
	Frequency	Percentage	Frequency	Percentage			
< 18.5 (Underweight)	3	42.86	4	57.14	7	100.00	0.001
18.5 – 22.9 (Normal)	20	71.43	8	28.57	28	100.00	
23 – 24.9 (Overweight)	34	80.95	8	19.05	42	100.00	
> 25 (Obesity)	129	90.21	14	9.79	143	100.00	

Based on Table 4, it was found that there was no relationship between dyslipidemia incidence by male workers with work status (p=0.505).

Table 4. The Relationship Between Work Status of Male Workers and The Incidence Of Dyslipidemia 2021

Work Status	Dyslipidemia Incidence				Total		p
	Dyslipidemia		Normal		Frequency	Percentage	
	Frequency	Percentage	Frequency	Percentage			
Shift	77	86.52	12	13.48	89	100.00	0.505
Non-shift	109	83.21	22	16.79	131	100.00	

DISCUSSION

Dyslipidemia is one of the metabolic syndromes besides diabetes mellitus and hypertension which is the main factor of atherosclerosis that can cause coronary heart disease, stroke, and peripheral vascular disease which is into the category of cardiovascular disease. According to the theory of H. L. Blum that several factors cause changes in public health, including heredity (age), behavior, environment, and health care where behavioral and environmental factors have a role in health status[11]. This study was conducted on male workers in one of the power plant operation and maintenance company in Jepara Regency who experienced dyslipidemia, it was found that there were several factors related to the incidence of dyslipidemia, age and body mass index (BMI) of male workers.

Regarding the relationship between age and the incidence of dyslipidemia in male workers, other studies also explained that the relationship between the incidence of dyslipidemia and age was similar to the conducted by Rahwati and Sartika[12] or in the research conducted by Dewi[13]. This was due to the increasing age, the body's ability to metabolize fat will decrease due to changes in adiponectin hormone secretion. Adiponectin hormone is a hormone that has important biological activity on the metabolism of glucose, fat and affects the insulin resistance. The important thing is the incidence of dyslipidemia will be more prevalent in men under 50 but for those aged over 50, the prevalence in women is higher. The cause of this phenomenon is before menopause, the hormone estrogen optimally regulates the balance of cholesterol and other blood lipids, but after going through menopause, there is an increase in the fat profile due to reduced estrogen hormone[5].

Another factor related to the incidence of dyslipidemia is the status of body mass index (BMI) where the male workers who experience dyslipidemia have a body mass index (BMI) of more than 25 (>25), where this figure is categorized as obese based on Asia Pacific guidelines classification. This study shows similarities with other studies that have been carried out previously that showed a significant relationship between body mass index (BMI) and the incidence of dyslipidemia as carried out by Sartika[14], Hastiti[15], and Rahmawati & Sartika[12]. Accumulation of fat cells in the abdomen can increase the secretion of adipokines and triglycerides which are rich in VLDL particles excessively. This will be followed by the absorption of free fatty acids by the liver which is increased enough to cause hypertriglyceridemia. This mechanism is typical of the occurrence of dyslipidemia[12].

Dyslipidemia is caused by lifestyle behavior, an unbalanced between consuming vegetables, fruit, saturated fat, and carbohydrate foods[16]. According to Perkeni that the prevention of dyslipidemia can be done through lifestyle changes such as medical nutrition therapy which includes consuming a low-calorie diet by consuming fruits, vegetables, whole grains, fish, and lean meat, limiting the intake of saturated fat, trans fat, and cholesterol and carbohydrate[5]. Other things that are concern in preventing dyslipidemia are losing weight and doing physical activity at least 30 minutes 4-6 times a week[5].

Another factor in the study that showed there is no relationship with the incidence of dyslipidemia in male workers in the company is work status or the difference between male workers who worked shifts and non-shifts. The company that has responsibility for the operation and maintenance has workers in the operations department who work with a shift. The shift was made into three shifts in one day, morning shift (07:00-15:00), afternoon shift (15:00-23:00), and night shift (23:00-07:00). while other workers work non-shift types such as in the maintenance department and other support departments whose working hours are from 07:30 to 16:30 but based on data analysis shows there is no relationship between the work status of male workers in the company and the incidence of dyslipidemia.

The limitation of this study is that this research only takes medical check-up data which should be explored using other measurement tools such as interviews where this is due to time constraints and limited data access.

CONCLUSION

Based on the results of the study, 186 (84.55%) male workers in one of the power plant operation and maintenance company (PLTU) in Jepara experienced dyslipidemia. The factors that had a relationship with the incidence of dyslipidemia in this study were age and body mass index/BMI however the factor that had no relationship with the incidence of dyslipidemia in this study was work status. Referring to the analysis of this study to prevent the incidence of dyslipidemia, the company needs to initiate health/fitness programs, and also create health promotion programs, especially about the importance of maintaining health with a healthy lifestyle.

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