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RESEARCH ARTICLE

Description of physical fitness, blood glucose, and cholesterol levels of the middle age operational workers in transportation company

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ABSTRACT

Background: Physical fitness (PF) is a key to maintain company productivity. The transportation company has complicated jobs and high physical demand. Aging, obesity, and sedentary lifestyle can decrease PF and work productivity. Maintain the good PF is necessary to increase productivity in aging employee. However, load and type of work seem did not affect significant to the PF from middle age workers from transportation company models. **Aims and Objective:** The objective of this study is to examine the PF status among transportation company employees. **Materials and Method:** A total of 340 transportation company workers, divided into officer and engineer group, were participated in a randomized study. Body mass index (BMI), vital lung capacity, and recovery pulse were measured to examine the PF in both the groups. Fasting venous blood was taken and subjected to glucose and total cholesterol examination. **Results:** Prevalence of low PF was found in 62% of population, and only 12% of the population has an average level and interestingly only 1% showed a good PF level. Average of BMI level is 25.5, total cholesterol 208 ± 25.1 mg/dL, and fasting blood glucose 94.23 mg/dL. Engineer worker group showed the lower level in BMI, waist circumference, and pulse recovery in 1 min compared to office worker and showed that there is no significant difference in lung capacity. **Conclusion:** Based on these results, transportation company worker age > 45 years old have poor VO_2max, hypercholesterolemia, and slight overweight. Exercise treatment program may be a very good approach for optimizing quality of life the workers.

KEY WORDS: Energy Balance; Metabolic Syndrome; Physical Activity; Physical Fitness

INTRODUCTION

Transportation company employee faces complicated job demand. Field operation worker faced high physically challenged in the field to ensure that the transportations run on time and travel safely. Some transportation railroad workers are responsible to drive transportation while the others operate signals and switches in the rail yard. Examples are traffic control management, monitor all transportation movement, prepare the maintenance service, repair the transportation, and operate the locomotive. On the other hand, office transportation worker spent most of working hours to writing reports, administrative jobs, and developing the transportation company. Despite the job description, transportation company workers need to maintain its physical fitness (PF).[1]

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Human physical function or physical ability is defined as the degree to which a person can manage the physical tasks and fitness of daily living. PF represents a person's general physical health status.[2,3] The level of PF was associated with degenerative diseases such as hypertension, metabolic syndrome, diabetes, and cognitive impairment.[4,5]

The elderly aged population requires special attention with respect to health and social issues. The health of the elderly proceeds on a continuum that begins with development symptoms associated with daily activity changes, musculoskeletal degenerative, cognitive impairment, continues to disease onset, functional loss and disability, and ultimately, terminal status and death.[6-8]

The regular physical activity (PA) can improve PF and health as prevention disease problem.[9-11] Several studies have shown that physically active adults are healthier and have a higher PF than inactive adults throughout different nations and populations groups.[11-13] PA is promoted as part of a healthy lifestyle.[14] The current understanding of the relationship between PA, PF, and health can be visualized using the model from Bouchard *et al*., and the model illustrates that PA can influence fitness and health.[15]

Good cardiovascular fitness may help the worker to achieve their best performance in the work field. Therefore, the aim of this study is to measure of VO_2max for PF and concentration in transportation worker companies whom worked as officer and in field. However, workload and type of work in transportation require a good PF, especially for middle age worker. Interestingly, we did not observe good PF level of the workers. This situation will lead to higher number of worker sickness which increases company cost to maintain worker's health performance. The importance of this study will inform baseline data for a strategy to improve the quality of life for middle age worker in transportation company.

MATERIALS AND METHODS

Participants

The participants were all transportation company employees, male, aged between 45 and 60 years. A total of 340 participants were examined. The study was conducted on May–August 2017. Physical examination procedures were informed to all participants. All participants give their consent before the study. The study has been generated in accordance to Declaration of Helsinki and approved by Ethical Committee of Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia. All procedure was informed to the subjects before physical examination and testing. All participants signed the written consent.

PF Assessment

General characteristics of the participants are presented in Table 1. PF of subjects was measured using modified Harvard step test with step height 40 cm. The observer calls the rhythm, at the signal "start" stopwatch is started, the metronome is turned on. The subject places one foot on the platform and later the other and immediately steps down and brings down the same foot first which he placed up first. All subjects were stopped at 5 min. When the subject successfully completes the test, recovery time starts counting. In the recovery time, subjects might sit or lie on the cot. The pulses were measured on 1, 2, and 3 min after recovery. The first reading was from 1 min to 1 min 30 s after the exercise, the second reading was from 2 min to 2 min 30 s after the exercise, and the third reading was from 3 min to 3 min 30 s after the exercise. The PF index is calculated using the following formula.[15]

Laboratory Examination

The subjects were asked to fasting 12 h prior the blood sampling. Blood sampling was taken from cubital venous and subjected to fasting blood glucose and total cholesterol measurement. Blood laboratory examination was performed in Central Laboratory, Jatinangor, Indonesia.

Statistical Analysis

Homogeneity and normality of distribution of the data were determined using Kolmogorov–Smirnov test. Independent *t*-test were used to analyze the differences between the groups. Data included a result the test of PF assessment, PA, metabolic syndrome, and balance energy. The data were analyzed statistically using computer software SPSS 22.0. Data were presented as mean ± standard deviation and $P < 0.05$ is considered to be statistically significant.

RESULT

A total of 340 males (age 46.53 ± 4.847 years) were participated in this study. All subjects were worked in the same transportation company. General characteristics of subjects are presented in Table 1. The average age of 340

Table 1: General characteristics of subjects

Characteristics	Mean±SD
Age (years)	46.53±4.847
Body height (cm)	168.07±9.468
Body weight (Kg)	68.448±13.16
Waist circumference (cm)	117.772±15.22
Blood pressure (mmHg)	
Systole	119±13.9
Diastole	79.479±7.32
Cholesterol (mg/dL)	208±25.1
Fasting blood glucose (mg/dL)	94.23±34.98
BMI	25.24±3.66

BMI: Body mass index, SD: Standard deviation

transportation company workers is 46.5 years [Table 1]. Majority has overweight, body mass index (BMI) 25.24 [Table 1], and cholesterol level 208 mg/dL. Blood pressure was normal 119/79 mmHg. Blood glucose level was 94.23 mg/dL [Table 1].

PF Status of Transportation Company Workers

VO_2max level shows that 69% of subjects had poor PF. Only 12% had average PF. 19% of participants drop-out from this study due to health limitation. The detail of VO_2 max levels is shown in Figure 1. Transportation company workers were divided based on the work location into office and engineer worker. We observed that engineer worker showed 10% less in BMI, waist circumference, pulse recovery in 1 min compared to office worker. Moreover, we did not observe any significant difference in lung vital capacity. Office worker showed higher BMI and waist circumference than engineer group and supported by the pulse recovery time data which were shorter in engineer group compared to the officer group. However, we did not observe any difference in lung vital capacity in either group [Figure 2].

DISCUSSION

PF of transportation company worker prevalence was lower than standard. This result was based on the result of the PF assessment that was dominated by low category (46.38%) and mild and sedentary category (14.46%). Comparison between office worker group and field group showed that the office worker group has higher BMI (25 vs. 22) compared with field worker group, $P < 0.05$. On the other hand, waist circumference of the office worker group is significantly higher than the field worker group (this result suggests that field worker group possibly has higher PF due to high PA during working hours). On the other hand, office worker group has lower PF possibly due to sedentary working activity during working hours. Many transportation company workers, especially officer worker, did a moderate PA (54.83%) and less with good PA (1.2%). Most of transportation company workers are with an overbalance of the balance (84.94%) and less with stable balance energy (13.86%).

The regular PA can improve PF and health and help to prevent disease.[9-11] Several studies have shown that physically active adults are healthier and have a higher PF than inactive adults throughout different nations and populations groups.[11-13] PA is therefore promoted as part of a healthy lifestyle.[14] The current understanding of the relationship between PA, PF, and health can be visualized using the model from Bouchard *et al*., and the model illustrates that PA can influence fitness and health and that the relationships are also reciprocal.[15] In addition, other factors such as personal and social attributes, age, sex, and socioeconomic status are known to influence PF, health status, PA, and their relationships. Functional dependence in carrying out the basic activities of daily living was observed among the elderly people, and prevention of functional decline of the elderly people needs to be a priority. By knowing the changes, it may be an approach for detecting the functional decline at an early stage.[16]

Most of transportation company workers are with an overbalance of the energy balance (84, 94%) and less with stable energy balance (13, 86%). Understanding how the energy balance is altered by exercise may improve the care of two populations: Those who want to lose fat

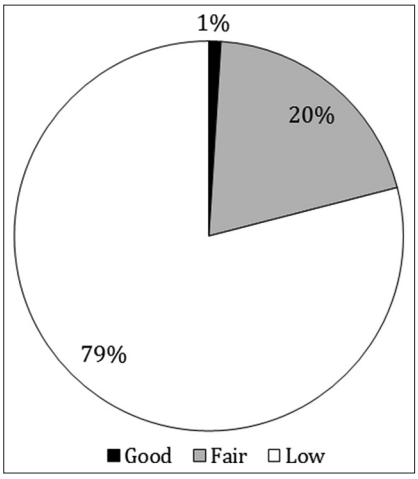

Figure 1: Physical fitness levels of the transportation company workers. Most of the workers had low physical fitness (79%), 20% had fair physical fitness. 1% of the worker had good physical fitness

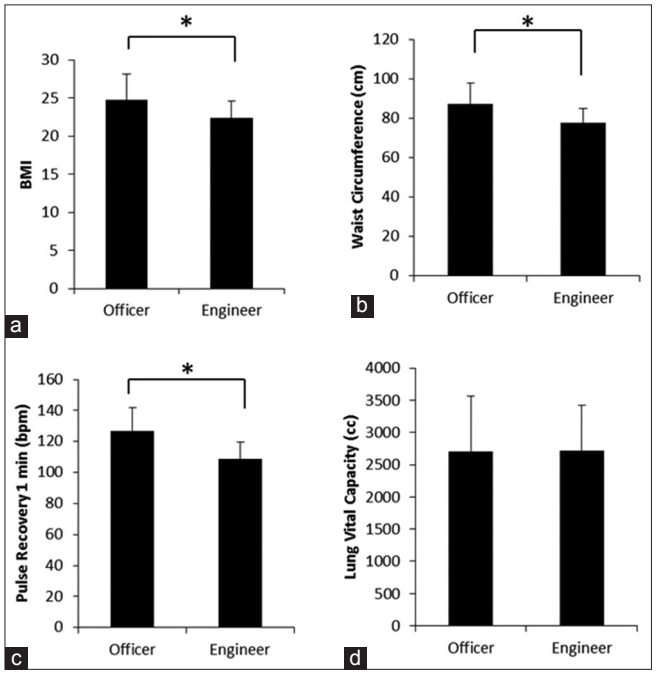

Figure 2: Body mass index and waist circumference of officer group are higher than engineer group (a and b). The pulse recovery time was shorter in engineer group compared to the officer group. (c) However, there was no difference in lung vital capacity in either group. Data were presented as mean±SD. *Means $P<0.05$. SD: Standard deviation

and body mass, thus seeking a negative energy balance (overweight/obese population), and those who need to maintain an equilibrium between energy intake (EI) and expenditure (moderate-to-high level athletes and soldiers). Concerning the first context, the rising worldwide incidence of obesity has become a major public health issue.[17,18] The simplest way to explain this epidemic is our modern way of life, resulting in a positive energy balance. Indeed, on one side, EI has increased owing to the large availability of high-caloric foods. On the other side, spontaneous energy expenditure (EE) has decreased for several reasons including the development of motorized transportation and professional tasks that mostly require a seated position.[19] The effect of healthy diets on preventing weight (re)gain or reducing body mass in overweight/obese individuals has been extensively studied, and their benefits and main limits (weight regain after drastic diets undertaken to lose body mass) are well known.[20]

In this study, many of transportation company workers also without metabolic syndrome (73, 5%). Metabolic syndrome (MetS) is a major public health problem worldwide.[21] On the previous study from Ramírez-Vélez *et al*., a diagnosis of MetS is based on the existence of pre-diabetes combined with dyslipidemia (elevated levels of total or low-density lipoprotein cholesterol or low high-density lipoprotein cholesterol levels), elevated blood pressure, and central adiposity.[22] Identifying individuals with MetS is important due to its association with an increased risk of coronary heart disease and Type 2 diabetes mellitus.[23] John *et al*. had reported that change and reduction of recovery pulse rate and lung capacity may occur due to many factor including neuromuscular feedback and alter homeostasis response.[24] For this reason, cardiovascular risk factor measurements are important, even at an early age, to detect a risk profile in time for an intervention.

Taken together, by understanding the baseline level of general PF of worker in transportation company PF, we may be able to set a goal or policy to improve their health status and good quality of life.

CONCLUSION

PF of the office worker is lower compared with engineer worker. This result was correlated with higher pulse rate after exercise in the office worker group. Office worker also has higher metabolic syndrome risk, based on the higher BMI and higher waist circumference compared with engineer worker group.

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