

Description of the pulmonary capacity of the parking workers at PT. Fajar Graha Pena Makassar

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Abstract: Pulmonary capacity is the maximum amount of air a person can expel from the pulmonary determined by the development of the respiratory system.. This study aims to describe the pulmonary capacity of the parking workers at PT FajarGraha Pena in Makassar. This descriptive study used an exploratory approach. Respondents were 9 people obtained by a total sampling technique. Quantitative research method was applied in data collection. Data were acquired using questionnaires and spirometry. The results showed that three out of nine respondents experienced decreased pulmonary capacity. Pulmonary capacity was influenced by several variables including sex, sleeping pattern, smoking habit, exercise, and air pollution. Mostly, decreased pulmonary capacity was influenced by smoking habit and irregular sleeping pattern. In order to prevent decreased pulmonary capacity, parking workers is are suggested to change their living habits and the company management is recommended to revise the working hours policy.

Keyword: *pulmonary, pulmonary capacity, parking workers*

Introduction

Data obtained from the general directorate of traffic shows that the number of motorized vehicles in Indonesia's big cities is quite high and has grown at 8-12% per year (1). This condition encourages the development of closed parking systems, especially in big cities. This type of parking lot has a weakness because it usually does not pay attention to the environmental health aspect of the users and the workers of the parking area (2), (3). Motorized vehicles are the main source of air pollution in urban areas and contribute 70% of NO_x emissions, 52% of VOC emissions, and 23% of particulates (4). Small particles, called particulates can affect lung capacity (1). Mineral dust exposure causes typical changes in respiratory mechanics and lung volume in restrictive patterns (5).

In Lahore, Pakistan, from 76 respondents (46 females and 30 males), it was found that the lung capacity values in 22% of women and 23% of men were less than predicted (6), (7)a. From 37 respondents obtained from welders working in Pisangan, Ciputat, Banten in 2010, it was found that 14 people (37.8%) experienced KVP restriction, while 23 people (62.2%) did not experience it (8). Meanwhile, PT FajarGraha Pena as a service company located in the middle of Makassar city. is visited by many people, and of course its open parking area and its particular basement for visitors.

In order to find out the description of the parking workers' pulmonary capacity, a measurement needs to be done based on age, sex, length of service, length of work, and smoking habit of the parking workers at PT FajarGraha Pena Makassar. Pulmonary physiology test using spirometry examination is recommended for workers, aiming to know their total lung capacities or pulmonary capacities except lung capacities containing residual volume components to identify lung ventilation functional impairments (9). Pulmonary capacity measurement is urgently done among parking workers at PT FajarGraha Pena Makassar as a part of occupational health and safety program improvement, as well as a source of information for the company management teams and the community to raise their awareness about the importance of health.

This study purposes to describe the pulmonary capacity of the parking workers at PT FajarGraha Pena in Makassar.

Materials and Method

This research used descriptive exploratory method to study cause and effect variables occurred in the research subject to be then measured simultaneously. The population in this study were all parking workers at PT. FajarGraha Pena, with the total of nine workers.

This research was conducted in Makassar, South Sulawesi, from June 2 to August 30, 2013. The independent variables studied are age, sex, length of service, length of work, and smoking habit. Meanwhile, the dependent variable is the pulmonary capacity. The instrument used are Spirometry, the print out paper, nose clip, the ink, mouth piece, the recording paper, calibrated spirometer, body scale, and height measuring instruments.

In order to obtain more supporting data, the researchers distributed questionnaires containing list of questions to the workers thus did the interview too. Spirometry testing using a spirometer, coding, inputting, and describing the results of the examination were also done to measure the function of the lung physiology.

Results

Graha Pena Makassar is known as the first largest and the tallest one-stop building outside of Java.. As a building with the most complete and advanced service level, it is strategically built in the middle of Makassar. Supported by sophisticated and modern types of equipments and reliable human resources, Graha Pena Makassar becomes the only building that has complete facilities. PT. FajarGraha Pena stands on an area of 1,021 ha and has 17 floors consisting of a podium and a tower.

The measurement of the pulmonary capacity done among the parking workers at PT FajarGraha Pena Makassar revealed that from nine respondents, six respondents (66.7%) did not experience decreased pulmonary capacity , while 3 respondents (33.3%) experienced decreased pulmonary capacity.

Table 1. Distribution of Respondents Based on Pulmonary Capacity, Education, and Working Period of the Parking Workers at PT FajarGraha Pena Makassar in 2013

Pulmonary Capacity	Frequency (n)	Percent (%)
Normal	6	66.7
Abnormal	3	33.3
Total	9	100.0
Education	Frequency (n)	Percent (%)
Primary School	1	11.1
Junior High School	1	11.1
Senior High	7	77.8
Total	9	100.0
Working period	Frequency (n)	Percent (%)
< 1-year	5	55.6
> 1-year	4	44.4
Total	9	100.0

Based On the data presented in Table. 1, the total of respondents graduated from senior high school were seven respondents (77.8%), while the respondents attended junior high school and primary school were respectively one respondent (11.1%).

The work period category showed that from nine respondents, five respondents (55.6%) had worked for less than one year, and four respondents (44.4%) had worked for more than one year. The table also presented that only three out of nine research subjects under 30 years old experienced decreased pulmonary capacity. Based on the sex category of the respondents, three out of nine research subjects were male and experienced decreased pulmonary capacity. In addition, two of five respondents working under one year working period, also experienced decreased lung capacity. Meanwhile, in the category of more than one year working period, only one of four respondents suffered decreased pulmonary capacity.

Table 2. Distribution of Respondents Based on the Working Hours of the Parking Workers at PT FajarGraha Pena Makassar in 2013

Pulmonary Capacity	Working Hours	Percent (%)
	≤ 8 hours	
Normal	6	6
Abnormal	3	3
Total	9	9

Table 2 showed that three out of nine research subjects with less than eight hours of working suffered decreased pulmonary capacity.

Table 3. Distribution of Respondents Based on the Smoking Habits of the Parking Workers at PT FajarGraha Pena Makassar in 2013

Pulmonary Capacity	Smoking habit		Percent (%)
	Yes	No	
Normal	3	3	6
Abnormal	2	1	3
Total	5	4	9

In Table 3, according to the investigation towards the smoking habits of the workers, two out of five research subjects with smoking habits suffered decreased pulmonary capacity. While in a group of respondents having no smoking habits, only one of four research subjects were identified experiencing decreased pulmonary capacity.

Results Of Interview :

1. Respondent01

The interview results showed that the respondent had worked as an OB (office boy) in a university in Makassar. He had worked for about three years with nine working hours a day in a dusty environment.

During his work at PT. FajarGraha Pena, he sometimes got night shift when other workers could not come. The respondent might work overtime seven times a month. The respondent usually took a break at night for about three hours after work. It can be inferred from the following interview results:

"I work overtime about seven times a month, I rarely get night shifts, unless my friends fail to attend their shifts." (AB)

"The night shift usually starts at 03.00 a.m., so I arrive at home at 08.00 a.m. and then I sleep and wake up at 11.00 a.m. or 12.00 p.m." (AB)

In his everyday life, the respondent often consumed ready-to-eat food as his daily menu and usually took yellow rice for his breakfasts. This condition affected the nutritional status of the respondent that categorized as thin. Although the BMI (Body Mass Index) value of the respondent categorized as thin,

the respondent's pulmonary condition was normal. It could be happen because the respondent did not smoke,, exercised regularly and had good sleeping patterns.

2. Respondent02

Interviewinga19-year-old respondent withprimary education level and had been working for three years revealed thatthe respondent started to smoke when he was 10 years old, smoking five up to fourteen cigarettes a day.

Before workingat PT FajarGraha Pena, the respondent used to work as construction workers in a dusty work environment. In a day, the respondent had to work eight to sixteen working hours every weekdays for nine years.

During his work at PT. FajarGrahaPena , the respondent worked overtimefour times andattended the night shift twice a week. The respondent said that usually after he workedthe night shift, the next day he took a rest between 08.00 a.m. to02.00 p.m. Meanwhile, in a month, the respondent gotfourdays off.The respondents also did exercises in his spare time. The following are the statements of the respondent during the interview:"Sometimes, I should work overtime four times a month" (YY)

"When the night shifts, I usually takesome break and work again at 03.00 a.m." (YY)

as stated in the following interview result:

"I often cycle when I don't workovertime, I usually cycle every afternoon between 04.00 p.m. to 06.00 p.m."

In daily life,the respondent often had different menus for breakfast and consumed eggs more often in other meal times. The respondent usually took a rest at night started at 12.00a.m..Meanwhile, the result of the pulmonary capacity measurement revealed that the blue indicator was quite normal for a person with thin BMI. Itmight be influenced by the life habit of the respondent who exercisedfrequently, lived in a pollution-free residences, and the amount of mercury ofother factors.

3. Respondent 03

Before the respondent worked at PT FajarGraha Pena, therespondent had worked in various places, and the last was atMataharistore in Kendari for one and a half years.

After working at PT FajarGraha Pena,The respondent usually worked overtime four times a week and night shift 12 times a month. Usually, after getting the night shift, the respondent took a rest for two hours.

The pulmonary capacity inspection result of the respondent showed that he was in the normal category, but hispoor living habit such as smoking habit and poor bedtime habitmight cause health problems later. Poor residential environment as mentioned by the respondent in the following might also exacerbated the condition:

"The residential environment is not that good since people living here tend tothrow awaygarbages recklessly." (IM)

"Every night, I go to sleep at midnight for about five hours long." (IM)

Lack of adequate sleep and rest during the day after getting the night shift certainly affected the respondent's organ functional ability, even though the respondent used torun in the morning for half an hour and consume different type of menus every day.

Usually, the respondent did health screening test to assess his likelihood of having particular disease..

"I will only have a health check for disease screening." (IM)

4. Respondent 04

The interview results revealed that the respondent hadbeen working for a month at PT FajarGraha Pena started righafter graduating from high school education and he had never worked previously. The respondent worked night shift twice a week and hadone day off a week. Usually, the respondent took a rest for four hours after working night shift.

The Respondent was an asthma sufferer. However, the result of the pulmonary capacity examination was normal. It mightbe highly correlated with his daily routines.The respondent usually playedsoccer for three hours three timesa week and had variety of food menus for breakfast.

Respondents usually slept at 10.00 p.m.or at 12.00 a.m..

5. Respondent 05

The interview result showed that the respondent who was still 23 years old suffered stage II decreased pulmonary capacity even though he was not a smoker. It was due to his poor living habit, such as fast food eating and irregular sleeping as mentioned in the following:

"I usually have only two hours of sleep after Fajar prayer time." (FD)

In general, during the night, human body takes time to rest and provide energy for the next day activity. Before working at PT FajarGraha Pena, the respondent used to work as a construction worker in a dusty work environment for three years with eight working hours a day.

"I started my first job when I was in high school and I had worked for three years." (FD)

The respondent worked overtime twice or three times a week and had night shift twice a week. After working the night shift, the respondent usually rested for 6 hours. The following is the interview results:

"I was able to shift the night every ten days if now 2 days a week" (FD)

6. Respondent 06

The respondent who had been working for about two years at PT FajarGraha Pena stated that he worked overtime three times, night shift five times and had one day off a week. In a day, the respondent rested for only two hours after getting night shift.

The result of the pulmonary capacity screening was normal, but the respondent often complained of cough. In the daily life, the respondent usually ate meatballs. Every day, the respondent usually slept at 12.00 a.m. Other factors that might affect his condition were the habit of taking shower at night, going out at night and using fan while sleeping at night. In addition, the respondent usually exercised three times a week. He commonly played soccer for 2 hours. The interview results are as follows:

"I often eat fast food and rarely have breakfast." (AH).

"I always hang out until midnight, take shower at midnight, and sleep with a fan on at night." (AH)

7. Respondent 07

Before the respondent worked at PT FajarGraha Pena, he worked as a marketing officer in a pharmaceutical manufacturing company. The following is the interview result: "Most of the time, I work in the field, meeting with partners or doctors from 09.00 a.m. to 02.00 p.m. and from 05.00 p.m. to 01.00 a.m. depending on the schedule." (AD).

The respondent was 23 years old and began smoking when he was 14 years old and spent more than 15 cigarettes a day. The following is the interview result: "I can spend a pack of cigarettes while playing games" (AD)

Although the respondent often played soccer, his heavy smoking habit certainly affected the development of his lungs. Therefore, even though he was still 23 years old, he experienced stage II decreased pulmonary capacity. The condition might become worse due to his poor living habit, such as consuming unhealthy foods, leaving breakfast, and sleeping late at night. The interview result is presented as follows:

"I sleep at 02.00 a.m., but sometimes I stay awake all night long to play games." (AD)

Discussion

Pulmonary capacity is the maximum amount of air a person can expel on a single breath. It includes inspiratory reserve volume, tidal volume, and expiratory reserve volume. The capacity was measured by asking the respondents to take a maximum inspiration, then exhale as much air as possible in the blue measuring instrument (2). From nine research subjects in this study, three of them suffered decreased pulmonary capacity. The result of the investigation revealed that the respondents were all male and under 30 years old.

According to a theory, under 30 years old workers were assumed to be most likely experience decreased pulmonary capacity because they were still in the phase of organ development. The result of the study found that three respondents under 30 years old experienced decreased pulmonary capacity. In this case, several factors such as smoking habit and sleeping pattern were suspected to be trigger factors of pulmonary function (10).

In the interviews, all of the respondents stated that there was no examination done before and after working at PT FajarGraha Pena. PT FajarGrahaPena stipulatedthat the working hours should not exceedeight hours a day following the KEP. 51/MEN/1999 which had set a policy concerning at working hours that working hours must, in principal, not exceed eight hours a day or 40 hours a week(11). However, most of the workers had different shifts and working hours each week.

During their work at PT. FajarGraha Pena Makassar, each respondent got two days of night shift (shift 3) starting at 11.00 p.m.until 07.00 a.m. in a week, and one day of day shift (Shift 2) starting at 03.00 p.m. – 11.00 p.m.Theoretically, it was assumed that the workers who got the night shift (11.00 p.m. – 07.00 a.m.) should have their next night shift after two or three days of day shift. Working at night triggered some psychological reactions,thus there were many complaintscomingfrom the night workers. Working the night shift usually caused cumulative effect, i.e., the longer the workers worked at night, the more the effect(12).

Based on the research (8), it was shown that age, sex, respiratory disorders, smoking history, and pulmonary disease history affected the Peak Expiratory Flow Rate (PEFR) examination results.In addition,beside cigarettes,other factors affectedpulmonarycapacity were work shift, vehicle pollution, and lack of exercise.Based on John Hutchison's interpretation,pulmonary capacity could be influenced by sex, age, weight, height, working time and several other factors (body position, strength of respiratory muscle, history of illness, employment history, exercise routine, smoking history, and nutrition).

According to (8), the adult male pulmonary capacity was 20-25% higher than adult women. Itwas due to the differencesof the muscle strength between men and women. Beside physical characteristics, such as age, height, and weight,other factors such as chest development, strength of breathing muscles, lung distensibility and chest wall affected the value of the pulmonary capacity.

Limitation of the study

Some limitations in this study should be noted. First, location restriction affected the number of samples of the research might bias the results of the study. Second, the sample were limited to only workers who worked less than threeyears.

Conclusion

To sum up, reductions in lung capacity are experienced by two workers with less than one year period of work, three workers with less than eight working hours according to NAV, and two with heavy smoking habits. . In addition, poor sleeping pattern also affects the decreased pulmonary capacity suffered by workers at PT FajarGrahaPena .

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