LUNG FUNCTION IS DECLINED IN SMOKING "BECAK" DRIVERS

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ABSTRAK

Rokok mengandung zat kimia yang berbahaya yang menyebabkan gangguan pernapasan seperti bronkitis kronis, emfisema, asma bronkial, kanker paru, dll tanda awal gangguan pernapasan adalah penurunan fungsi paru-paru. Oleh karena itu tujuan dari penelitian ini adalah untuk mengakses hubungan antara kebiasaan merokok dan penurunan fungsi paru-paru pada tukang becak di Kabupaten Gresik, Propinsi Jawa Timur. Penelitian ini dirancang sebagai studi potong lintang analitik observasional. Populasi penelitian adalah becak tukang di Gresik, Kabupaten Gresik, Propinsi Jawa Timur. Jumlah sampel 38 becak tukang yang dipilih dari populasi dengan kriteria tertentu yaitu laki-laki, 30-40 tahun, tidak memiliki riwayat medis penyakit pernapasan, dan bebas dari gejala pernapasan. Dari 35 tukang becak, 23 perokok , 12 bukan perokok. Fungsi paru diukur menggunakan spirometer oleh komputerisasi Spirovit Schiller SP-1 dibuat di Jerman 2001 di Rumah Sakit Petrokimia, Gresik. Hubungan antara merokok dan penurunan fungsi paru dianalisis menggunakan uji probabilitas eksak Fisher. Perbedaan parameter fungsi paru antara kebiasaan merokok dan bebas rokok kebiasaan pada tukang becak dianalisis dengan menggunakan uji t untuk 2 sampel independen uji statistik. Hasil penelitian menunjukkan bahwa 15 (65,20%) dari 23 tukang becak perokok memiliki gangguan pernapasan yaitu 7 orang dengan obstruksi pernapasan, dan 8 orang dengan hambatan pernapasan. Sedangkan hanya 3 (25.00%) dari 12 tukang becak bukan perokok memiliki gangguan pernapasan yaitu 2 orang dengan obstruksi pernapasan, dan 1 orang dengan hambatan pernapasan. Ada hubungan yang signifikan (uji eksak Fisher, p <0,05) antara kebiasaan merokok dan penurunan fungsi paru pada tukang becak. Menariknya,% FVC dan FEV1% diperkirakan sangat nyata pada tukang becak perokok (uji t untuk 2 sampel independen, semua p <0,05) lebih rendah dibandingkan tukang becak non-perokok. Disimpulkan bahwa ada hubungan yang jelas antara kebiasaan merokok dan penurunan fungsi paru-paru pada tukang becak di Gresik, Kabupaten Gresik, Propinsi Jawa Timur. Selain itu, merokok dapat menyebabkan gangguan pernapasan seperti obstruksi jalan napas dan hambatan saluran napas. Sangat disarankan tukang becak untuk berhenti merokok, dan pemerintah daerah menciptakan peraturan anti merokok untuk menekan kebiasaan merokok pada tukang becak dan juga untuk semua warga negara pada umumnya.

ABSTRACT

Cigarette contains various dangerous chemical substances that lead to respiratory impairments such as chronic bronchitis, emphysema, bronchial asthma, lung cancer, etc. Early sign of respiratory impairments is decline in lung function. Therefore the aim of this study was to access relationship between smoking habits and decrease of the lung function in "becak" drivers in Gresik District, Gresik Regency, East Java Province. This study was designed as a cross sectional observational analytic study. Population study was "becak" drivers in in Gresik District, Gresik Regency, East Java Province. Number of sample was 38 "becak" drivers who selected from the population with certain criteria i.e. male, 30-40 years old, no medical history of respiratory diseases, and free from respiratory symptoms. Among those 35 becak drivers, consist of 23 smoking "becak" drivers and 12 non-smoking "becak" drivers. Lung function was measured using by computerized Schiller Spirovit SP-1 Spirometer made in Germany 2001 at Petrochemical Hospital, Gresik. Association between smoking and lung function decline was analyzed using by Fisher's exact probability test. Differences of lung function parameter between smoking habits and non-smoking habits in "becak" driver were analyzed using by t test for 2 independent samples statistical test. Results of this study showed that 15 (65.20 %) out of 23 smoking becak drivers had respiratory impairments i.e. 7 persons with respiratory obstruction; and 8 persons with respiratory restriction. Whereas only 3 (25.00 %) out of 12 non-smoking becak drivers had respiratory impairments i.e. 2 persons with respiratory obstruction; and 1 persons with respiratory restriction. There was a significant association (Fisher's exact test, p <0.05) between smoking habits and lung function decline in becak drivers. Interestingly, FVC % predicted and FEV1 % predicted in smoking becak drivers were significantly (t test for 2 independent samples, all p <0.05) lower compared to non-smoking becak drivers. It is concluded that there is clear relationship between smoking habits and decrease of the lung function in "becak" drivers in Gresik District, Gresik Regency, East Java Province. Moreover, Moreover, smoking may lead respiratory impairments such as airway obstruction and airway restriction. It is strongly suggested to "becak" driver to quit smoking; and local government creates anti smoking regulation in order to suppress smoking habits among the "becak" drivers as well as for all citizens in general.

Keywords: *"becak" drivers, lung function decline, smoking habits.*

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INTRODUCTION

Tobacco lead to death in 3 millions people in the world every year, or around 8,129 people death per day, or 57 people death every minute in year of 2000 (WHO, 2008). If there is no significant actions, by year of 2025, it is predicted that there is 10 millions people death per year, 7 millions of them happens in third world including Indonesia (Aditama, 2001). In 2001, among the poor Indonesian citizen spend 91 % of their expenses for tobacco consumption, whereas among the rich Indonesia they spend only 7.5 % of their expending for tobacco consumption. It will give big impact to family nutrition and health status especially in the poor community (Syahdrajat, 2007). There is increasing number of young smokers and children under 10 years old in Indonesia from 0.4 % to 2.8 % in period of 2001 to 2004, and It is expected 400 thousands people death due tobacco smoking (WHO, 2008). Cigarette contains more than 4000 hazardous chemicals, 40 out of them can lead to induced lung cancer, coronary heart disease, and other chronic diseases such as chronic obstructive lung disease i.e. chronic bronchitis, emphysema, and asthma bronchial. The main toxic substance in cigarette is tar, nicotine, vinyl chloride, benzo(a)pyrenes, nitroso-nor-nicotine compounds that have carcinogen effects to lung cancer; and carbon monoxide that leads to tissue and cell asphyxia leading to death (Triswanto, 2007). Recently WHO (2008) stated that cancer diseases donated the biggest number of cancer death rate and 43 % out of them is lung cancer due to cigarette smoking.

In Gresik District, the uptown of Gresik Regency, East Java Province, there is a lot of smoking "becak" drivers then they got two kinds of exposures i.e. city air pollutants and particles of cigarette smoke. Preliminary survey among 76 "becak" drivers in this area showed that 54 (71.10 %) "becak" drivers out of them are smoking and the rest of 22 (28.90 %) "becak" drivers out of them are non smoking. Since they smoke a lot around 10-20 cigarettes a day, 13 among those smoking "becak" drivers have complaints of cough in the morning, cough with sputum production, and shortness of breath. Early sign of chronic obstructive lung disease could be measured with means of lung function parameters. Therefore, the aim of this study was to analyze the association between smoking habits with lung function decline among "becak" drivers in Gresik District, the uptown of Gresik Regency, East Java Province.

MATERIALS AND METHODS

This study was designed as cross sectional analytic observational study to analyze the association between smoking habits with lung function decline among "becak" drivers in Gresik District, the uptown of Gresik Regency, East Java Province. All "becak" drivers were included in this study as study population with certain criteria i.e. 30-40 years old, male, do not have any respiratory complaints, and do not have any respiratory diseases. Then the number of sample was the total population i.e. 35 "becak" drivers that consists of 23 (65.71 %) smoking and 12 (34.29 %) non-smoking "becak" drivers. Data gathering were conducted in June 2009.

After gathering informed consent, each study participant was measured lung function parameters using by Auto Spirometer, Schiller Sprirovit SP-1 type, Made in Germany, year of 2002 by the same operator. After explaining the procedure, the participant in standing position was asked to take deepest inspiration and then to breath out as fast and completely as possible. Air movements are recorded as the maximal flow volume curve of the lung. Three recordings of forced vital capacity within 5 % or a 100 ml range are obtained from each participant. Parameters derived from the flow volume curves are forced vital capacity (FVC), FVC % predicted, forced expiratory volume in 1 second (FEV1), and FEV1 % predicted. Association between smoking and lung function decline was analyzed using by Fisher's exact probability test. Differences of lung function parameters between smoking habits and non-smoking habits in "becak" driver were analyzed using by t test for 2 independent samples statistical test. Probability value (p) <0.05 is considered as significant value.

RESULTS AND DISCUSSIONS

All smoking "becak" drivers smoked clove cigarette. Among 23 smoking "becak" drivers, 16 (69.60 %) out of them smoked unfiltered clove cigarette, 5 (21.70 %) out of them smoke filtered clove cigarette, and the rest 2 (8.70 %) "becak" drivers smoked both filtered and unfiltered clove cigarettes. Eighteen (78.27%) smoking "becak" drivers have smoked for more than 10 years, and the rest 5 (21.78 %) have smoked for about 5-10 years. Moreover, 13 (56.52 %) smoking "becak" drivers smoked 10-20 cigarettes per day, and each of 5 (21.74 %) smoking "becak" drivers less than 10 cigarettes per day and more than 20 cigarettes per day. Most of them (15 "becak" drivers or 62.22 %) smoked cigarettes by deep inhalation. As we already known that smoke cigarette by way of deep inhalation is more dangerous compared to un-inhalation way since many hazardous and toxic chemical containing cigarette smoke will penetrate into lung alveoli even into blood stream, go to the target organs. It may lead to heath impairments such

as lung cancer, coronary heart disease, and other chronic diseases such as chronic obstructive lung disease i.e. chronic bronchitis, emphysema, and asthma bronchial (Keman at al., 1996; Keman at al., 1997b; Triswanto, 2007; WHO, 2008).

Interestingly, results of lung function measurement among "Becak" Drivers in Gresik District, The uptown of Gresik Regency, East Java Province in June 2009 showed that among smoking "becak" drivers, 7 (30.43 %) smoking "becak" drivers had obstructive airway, 8 (34.78 %) smoking "becak" drivers had restrictive airway, and the rest of 8 (34.78 %) smoking "becak" drivers had normal lung function values. Whereas in non-smoking "becak" drivers, 2 (16.66 %) persons had obstructive airway, only 1 (8.33 %) person had restrictive airway, and most of them or 9 (75.00 %) had normal lung function values (see Table 1 below).

Association statistical test of Fisher exact probability test was conducted to analyze relationship between smoking habits and airway impairments i.e. obstructive and restrictive airway among "Becak" Drivers in Gresik District, the uptown of Gresik Regency, East Java Province. The result showed that there was a significant association (Fisher's exact test, $p < 0.05$) between smoking habits and obstructive decline in those "becak" drivers. It is clear that smoking may lead to respiratory impairment such as airway obstructive and restrictive in those "becak" drivers. This study results are inline with several previous studies on relationship between smoking and respiratory impairments (Brooks and Kalica, 1987; Keman et al. 1996; Keman et al. 1997a; American Thoracic Society, 1987; American Thoracic Society, 1993; Becklake, 1994).

Flow volume curve measurements among "becak" drivers in Gresik District, the uptown of Gresik Regency, East Java Province showed that means of FVC, FVC % predicted, FEV1, and FEV1 % predicted parameters were not bad for both smoking and non smoking "becak" drivers. However, for those parameters, smoking "becak" drivers had significantly decline compared to non-smoking "becak" drivers (t test for 2 independent samples, all $p < 0.05$). Therefore, it is noteworthy that there is lung function decline in smoking "becak" drivers in Gresik District, the uptown of Gresik Regency, East Java Province. This phenomenon has also already elucidated by previous studies (Brooks and Kalica, 1987; Keman et al. 1996; Keman et al. 1997a; Becklake, 1994) that smoking induces respiratory impairments including decline in lung function.

Table 1. Number of obstructive, restrictive and normal lung function among "becak" drivers in gresik district, the uptown of Gresik Regency, East Java province, in June 2009.

Smoking Habits	Obstructive	Restrictive	Normal Lung Function	Total
Smoking "Becak" Drivers	7 (30.43 %)	8 (34.78 %)	8 (34.78 %)	23 (100.00 %)
Non Smoking "Becak" Drivers	2 (16.66 %)	1 (8.33 %)	9 (75.00 %)	12 (100.00 %)
Total	9 (25.71 %)	9 (25.71 %)	17 (48.58 %)	35 (100.00 %)

Note :
Obstructive : FVC decline or normal, FEV1 decline, FEV1/FVC decline <80%
Restrictive : FVC decline, FEV1 normal or decline, FEV1/FVC normal or >80%
Source: Morrisey W (1983) Respiratory Disease. St Louis: Mosby Co.

Table 2. Mean + SD Values of FVC and FVC % predicted; FEV1 and FEV1 % Predicted among "Becak" drivers in Gresik District, the uptown of Gresik Regency, East Java Province, in June 2009

Lung Function Parameter	Smoking "Becak" Drivers (n = 23)	Non Smoking "Becak" Drivers (n = 12)	*p* value
FVC (liter)	3.06 ± 0.77	3.70 ± 0.73	0.02 *
FVC % Predicted	92.00 ± 24.79	112.42 ± 25.38	0.02 *
FEV_1 (liter/second)	2.53 ± 0.77	3.13 ± 0.72	0.03 *
FEV_1 % Predicted	84.13 ± 24.15	106.42 ± 27.90	0.02 *

* = significantly difference, t test for 2 independent samples, all $p < 0.05$

CONCLUSIONS

It is concluded that there is clear relationship between smoking habits and decrease of the lung function in "becak" drivers in Gresik District, Gresik Regency, East Java Province. Moreover, smoking may lead respiratory impairments such as airway obstruction and airway restriction. It is strongly suggested to "becak" driver to quit smoking; and local government creates anti smoking regulation in order to suppress smoking habits among the "becak" drivers and its citizens in general.

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REFERENCES

1. Aditama TY (2001) Masalah Merokok dan Penanggulangannya. Jakarta: Yayasan Penerbitan Ikatan Dokter Indonesia
2. American Thoracic Society (1987) Standard for the diagnosis and care of patients with chronic obstructive pulmonary disease (COPD) and asthma. Am Rev Respir Dis. 137:225-243.
3. American Thoracic Society (1993) Guidelines for the evaluation of imparment/disability patient with asthma. Am Rev Respir Dis. 147:1056-1061.
4. Becklake, MR (1994) Relationship of acute obstructive airway change to chronic (fixed) obstruction. Thorax 50 (Suppl. 1):S16-21.
5. Brooks SM and Kalica AR (1987) Strategies for elucidating the relationship between occupational exposure and chronic airflow obstrucyion. Am Rev Respir Dis. 13:268-273.
6. Keman S, Willemse B, Wesseling GJ, Kusters E, and Borm PJA (1996) A Five Year Follow-Up of Lung Function among Chemical Workers Using Flow Volume and Impedance Measurements. Eur Resp J. 9:2109-2115.
7. Keman S, Jetten M, Douwes J, Borm PJA (1997a) Inflammatory markers in nasal lavage of cotton workers. Relation to endotoxin exposure and lung function changes. Int Arch Occup Environ Health 71:131-137.
8. Keman S, Willemse B, Tollerud DJ, Guievarra L, Schins RPF, and Borm PJA (1997b) Blood Interleukin-8 Production is increased in Chemical Workers with Bronchitic Symptoms. Am J Ind Med. 32:670-673.
9. Morrisey W (1983) Respiratory Disease. St Louis: Mosby Co.
10. Syahdrajat T (2007) Merokok dan Maslahnya. Journal Dexa Medika. (20) 4:15-19
11. Triswanto SD (2007) Stop Smoking. Yogyakarta: Progressive Books
12. WHO (2008) Tobacco Free Initiative. Geneva: World Health Organization