

Overview of Characteristics for Impaired Lung Function in Bendor Drivers in Gorontalo City in 2023

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ABSTRACT

Introduction: Impaired lung function is a functional disorder of the lungs that causes a slowing of airflow during respiration. Bendor drivers are a profession with a risk of decreasing lung function due to work activities that are always on the road and exposed to motor vehicle pollution. Exposure to cigarette smoke in active and passive smokers is also significant in causing several other respiratory diseases, such as chronic obstructive pulmonary disease (COPD). The purpose of this study was to describe the risk factors for impaired lung function in Bendor drivers in Gorontalo City in 2023.

Method: The research was conducted in June 2023 on eligible Bendor drivers accidentally found in Gorontalo City. The research instrument used a questionnaire, stress perception scale (SPS), and spirometry.

Results: The results obtained are the distribution of risk factors for impaired lung function in Bendor drivers in Gorontalo City in 2023, based on length of work found more work more than five years (63.33%), more work more than 8 hours a day (75%), had smoking habits with a smoking duration of more than ten years (58.3%) and smoked more than ten cigarettes a day (62.5%) and had a severe perception of stress (66.6%).

Conclusion: Bendor drivers are one of the contributing factors in impaired lung function. There is a relationship between the risk factors for smoking, length of work, duration of exposure to pollution, and perception of stress with lung function in Bendor drivers in Gorontalo City.

Key words: Bendor drivers, lung function, smoking, stress perception



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Introduction

Impaired lung function is when the lungs cannot expand elastically, or there is interference with the airways both structurally and functionally, which causes a slowdown in airflow during respiration. Types of lung function disorders can be Restrictive, Obstructive, and Mixed.^{1,2} Extrinsic or intrinsic factors can cause impaired lung function. Extrinsic factors that can interfere with lung function are inhalation of irritants such as gas, dust, and vapor.³ Smoking habits can also accelerate the decline in lung function.⁴ The World Health Organization (WHO) mentions chronic obstructive pulmonary disease (COPD) as the third most common cause of death globally, with smoking as the main factor. More than 90% of COPD deaths occur in low and lower-middle countries.^{5,6} Apart from that, air pollution is another factor, such as motor vehicle fumes, street dust, industrial exhaust gases, coal briquettes, and volcanic ash from volcanic eruptions, forest fire smoke, mosquito coil smoke, firewood smoke, stove smoke, workplace pollution, chemicals, dust/irritating substances, and toxic gases.⁷

Indonesia, as a country in Asia that is developing into a newly industrialized country, also faces air pollution problems, most often caused by motor vehicle exhaust and factory fumes.⁸ Disturbances commonly known as the result of Motor vehicle emissions are respiratory tract disorders, headaches, eye irritation, asthma exacerbation attacks, respiratory infections, impaired lung function, and heart disease.⁹ Psychological factors are also thought to affect lung function.¹⁰ Bendor drivers in Gorontalo City are a profession with a risk of decreasing lung function due to work activities that are always on the highway and exposed to motor vehicle pollution. This study aims to describe the prevalence and associated characteristics of abnormal lung function in the Bendor drivers in Gorontalo City.

Methods

This quantitative research was conducted at Gorontalo City in June 2023. The population in this study were Bendor drivers in Gorontalo City. Thirty eligible people were observed based on the purposive sampling technique. The inclusion criteria were male, aged ≥ 18 years, and fulfilling the requirement for the spirometry examination. Exclusion criteria in this study were Bendor drivers who were not willing or in sick condition, were too full, and had suffered from severe respiratory or mental illness. The variables in this study are the length of work, length of exposure to pollution, smoking habits, and perceptions of stress.

The data source in this study used primary data, namely data from the results of interviews with respondents through questionnaires and the consequences of pulmonary function examination using spirometry. Lung functions were classified into two categories.

Normal lung function category is determined if the forced vital capacity (FVC) is more than 80% predictive value and forced expiratory value in the first second (FEV1) or forced vital capacity is more than 75%. The abnormal lung function category is determined if the restricted defects (FVC less than 80% and FEV1 more than 75% predictive value), the obstructive defects (FVC is more than 80% and FEV1 is less than 75% predictive value), or the mixed defects (FVC is less than 80% and FEV1 is less than 75% predictive value) were found. In addition, stress perception was measured according to the Perceived Stress Scale questionnaire and classified the finding into two categories: normal results (total score between 13 and 19) or severe stress (total score more than 20).

The data analysis technique in this research was carried out using univariate analysis. Univariate analysis aims to explain or describe the characteristics of each research variable. In this study, the variables are smoking habits, length of work, length of exposure, perception of stress and lung function of bento drivers in the city Gorontalo. The data obtained in this study were processed using the Microsoft Excel program.

Results

Based on the research conducted, the distribution of respondents based on the age variable is shown in Table 1. It shows that the ages of 21-25 years and 26-30 years are the most age with seven people (23.3%), followed by the 41-45 years age group with five people (16.7%), and the lowest was in the age group 46-50 years and >50 years with two people (6.7%).

Table 1. Distribution of Bendor Drivers Based on Age

Age	Frequency	Percentage (%)
21-25 years	7	23.3
26-30 years	7	23.3
31-35 years	4	13.3
36-40 years	3	10
41-45 years	5	16.7
46-50 years	2	6.7
> 50 years	2	6.7
Total	30	100

The description of the distribution of respondents based on the length of work and daily workhours is shown in Table 2. It shows that 19 people (63.33%) worked more than five years as Bendor drivers and 11 (36.67%) worked less than five years as Bendor drivers. Based on the daily work hours, the distribution of Bendor drivers who work less than 8 hours

a day is six people (20%) and 24 people (80%) who work more than 8 hours a day.

Table 2. Distribution of Bantor Drivers based on length of work and daily workhours

Characteristics	Frequency	Percentage (%)
Length of Work		
≤ 5 years	11	36.67
> 5 years	19	63.33
Daily Workhours		
≤ 8 hours	6	20.0
> 8 hours	24	80.0
Total	30	100

Table 3 shows smoking behavior in the sample. Based on the length of smoking variable, the distribution of Bantor drivers who smoked for less than ten years was 13 people (43.3%), and Bantor drivers who smoked for more than ten years were 17 people (56.7%). Based on the number of cigarettes per day, the distribution of Bantor drivers who smoked less than ten cigarettes was 12 people (40%), and those who smoked more than 10 were 18 people (60%).

Table 3. Distribution of smoking behavior in Bantor drivers

Characteristics	Frequency	Percentage (%)
Length of Smoking		
≤ 10 years	13	43.3
> 10 years	17	56.7
Number of Smoke		
≤ 10 cigarette	12	40.0
> 10 cigarette	18	60.0
Total	30	100

Table 4 shows the distribution of Bantor drivers based on perceived stress. Nine people (30%) had normal stress perceptions and 21 (70%) had severe stress perceptions. Table 5 shows lung function distribution based on the characteristics of Bantor drivers in Gorontalo City. Based on lung function variables, the distribution of Bantor drivers with normal and abnormal lung function was six (20%) and 24 people (80%), respectively. Of the 24 abnormal lung function people, 15 (62.5%) worked for over five years. Moreover, 18 people (75%) worked more than 8 hours. In addition, 14 people (58.3%) had smoked for over ten years. Fifteen people (62.5%) smoked more than ten cigarettes a day. However, 16 people (66.7%) got the perception of severe stress.

Table 4. Distribution of Bentor Drivers based on Perceived Stress

Perceived Stress	Frequency	Percentage (%)
Normal	9	30
Severe	21	70
Total	30	100

Tabel 5. Distribution of Characteristics of Bentor Drivers based on Lung Function

Characteristics	Frequency	Percentage (%)
Lung function (N=30)		
Normal	6	20.0
Abnormal	24	80.0
Length of Work (N=24)		
< 5 years	9	37.5
≥ 5 years	15	62.5
Daily Workhours (N=24)		
≤ 8 hours	6	25.0
> 8 hours	18	75.0
Length of Smoking (N=24)		
≤ 10 years	10	41.7
> 10 years	14	58.3
Number of Smoke (N=24)		
≤ 10 cigarette	9	37.4
> 10 cigarette	15	62.5
Perceived Stress (N=24)		
Normal	8	33.3
Severe	16	66.7

Discussion

The present study revealed that 80% of Bentor drivers had abnormal lung function. A similar result was found in the village officials in Denpasar Timur, Indonesia. Most of the sample study (76.6%) had abnormal lung function, including 57.4% had restrictive lung dysfunction, 10.6% had obstructive lung dysfunction, and 8.5% had mixed lung dysfunction. Length of work and history of smoking habits were also found not to be associated with impaired lung function in the study.³

The study's results found 11 respondents who worked for less than five years (36.67%) and 19 who worked more than 5 years (63.33%). In this study, 24 respondents (80%) had impaired lung function. Of the 24 people, nine (36.67%) had worked for less than five years, and 15 (63.33%) had worked more than five years. This research aligns with the investigation of Wiwin Prasiwi and Sri Darnoto (2015), who examined the relationship between age and years of work and lung function capacity at SUPELTAS (traffic control

volunteers) in Surakarta. There was a relationship between years of work and lung function capacity at SUPELTAS Surakarta. The longer a person's working period coupled with a dusty and polluted work environment, the greater the risk of decreased lung capacity function. Someone who works > 5 years has a greater chance of experiencing impaired lung function than someone who works < 5 years.¹¹

Research on Marble Craftsmen conducted by Alia et al. (2022) through the results of a contingency correlation shows a positive value between length of work and impaired lung function, which indicates that the more extended the work period, the higher the risk of workers suffering from poor lung function, although the relationship is weak. Because the length of service does not always determine whether workers experience poor lung function.¹²

This research is different from Pradnyana and Muliarta (2015) on traditional stakeholders in East Denpasar District, which states that exposure to smoke only sometimes causes interference with lung function. There was no significant relationship based on the length of work for impaired lung function.³

The study found that six people (20%) worked less than 8 hours daily, and 24 (80%) worked more than 8 hours daily. In this study, 24 respondents (80%) had impaired lung function, and 6 (20%) had normal lung function. Of the 24 people, 6 (25%) worked less than 8 hours daily, and 18 (75%) worked more than 8 hours. Exposure time is expressed as the time a person spends at work. The length of time a person works in general is 8 hours per day. Most Bentor drivers in Gorontalo City work more than 8 hours daily (80%). This has a three times greater risk of developing lung function disorders because the longer a person is exposed to dust, smoke, and vehicle pollution, the greater the possibility of respiratory problems. This is in line with research on fish-smoking workers in Bandarharjo Semarang by Annisa et al. (2018), which illustrates that workers who work 8 hours a day are more at risk of experiencing respiratory and health complaints. This is likely a significant risk of developing lung function disorders because the longer workers are exposed to dust, the greater the possibility of respiratory problems.¹³

This study found that respondents who smoked for less than ten years were 13 people (43.3%), and respondents who smoked for more than ten years were 17 people (56%). Based on the number of cigarettes smoked in one day, 12 respondents (40%) smoked less than ten cigarettes daily, and 18 respondents (60%) smoked more than ten cigarettes daily. Of the 24 people with impaired lung function, 10 (41.7%) had smoked for less than ten years, and 14 (58.3%) had smoked for more than ten years. Based on the number of cigarettes smoked in

one day, nine people (37.5%) smoked less than ten cigarettes daily, and 15 people (62.5%) smoked more than ten cigarettes daily. This research is in line with research on male employees at the Rectorate Building at the University of Lampung by Nisa et al. (2015), which showed that there was a significant relationship between smoking duration and the interpretation value of the FEV1/FVC ratio. Smoking duration affects the ratio of forced expiratory volume in one second and forced vital capacity in male Rectorate of the University of Lampung employees. Daily cigarette consumption affects the ratio of one-second forced expiratory volume and forced vital capacity at the Rectorate of the University of Lampung. The daily consumption of 1-10 cigarettes is the dominant factor in reducing the FEV1/FVC ratio.⁴

This research aligns with the theory that smoking can cause changes in the anatomy and physiology of the respiratory system. Inhaled cigarette smoke causes increased fluid secretion in the bronchial tree and swelling or metaplasia of the epithelial layer. The nicotine content in cigarettes will constrict the terminal bronchioles, resulting in resistance to airflow into and out of the lungs. Nicotine can also damage the cilia on epithelial cells, so a lot of debris collects in the airway. Continuous smoking habits can cause a decrease in lung function.^{14,15}

Most of the respondents had severe stress perceptions. Of the 24 people with abnormal lung function, 8 (33.3%) had normal stress perceptions, and 16 (66.6%) had severe stress perceptions. This is in line with research conducted by Arunima (2019). In that study, workers with high-stress perception scores of 20 or more showed decreased FEV1 and FVC values. Most workers with a high perception of stress may have poor lung function test results. Increased levels of perceived stress can even affect lung function in young, healthy individuals.

Conclusion

This study had 24 (80%) Bentor drivers with impaired lung function. Based on the length of work, it was found that Bentor drivers with impaired lung function had worked more than five years (63.33%). This shows that the longer a person's working period combined with a dusty and polluted work environment, the greater the risk of decreased lung function. Based on the length of exposure, it was found that Bentor drivers with impaired lung function worked more than 8 hours a day (75%). This shows that the longer a person is exposed to dust, smoke, and vehicle pollution, the greater the possibility of respiratory problems. Based on smoking habits, Bentor drivers with impaired lung function have smoking habits for more than ten years (58.3%) and smoke more than ten cigarettes a day

(62.5%). This shows that continuous smoking habits can cause a decrease in lung function because nicotine can lead to constriction of terminal bronchioles and damage to cilia on epithelial cells. The majority of Bentor drivers with impaired lung function have a perception of severe stress (66.6%), indicating that increased levels of perceived stress can even affect lung function.

Conflicts of Interest

Nil

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