Journal of Tropical Pharmacy and Chemistry

Journal homepage: https://jtpc.farmasi.unmul.ac.id

Effect Analysis of Protein Intake of Pedicab Driver in Surabaya

Amelia Lorensia[1,*], Rivan Virlando Suryadinata[2], Bela C. M. Sidabutar[1]

[1] Faculty of Pharmacy, Universitas Surabaya, Surabaya
[2] Faculty of Medicine, Universitas Surabaya, Surabaya
*Author for coresponding: amelia.lorensia@gmail.com; amelia.lorensia@staff.ubaya.ac.id

Abstract

Approximately 64 million people suffer from COPD and 3 million people died because of this disease. No exception to pedicab rickshaw drivers, which is one job that has a high risk of copd. From workplace factors that are always exposed to vehicle fumes and dust pollution and also lifestyles such as smoking habits. Pedal rickshaw drivers are also classified as low economic groups, so their daily food intake is sometimes insufficient, especially the need for protein. Protein intake is very important in COPD, because it can improve the performance of respiratory muscles and improve immune function. This study uses a 24-hour recall method by recording the food taken by respondents in the last 24 hours to see how daily food protein intake. In this study, lung function measurements was performed using a spirometry test where the normal value is if FEV1/FVC> 70%. We Obtained 124 respondents with a total of 62 in the lung function disorder group and 62 non-impaired groups of respondents aged an average of 55-64 years with a history of working as a pedicab driver for approximately 5 years. In the different test the asymp sig has a result of 0.000 where the conclusions in this study as follows: there is a significant difference between daily food protein intake in the pedicab rickshaw driver group with impaired and non-impaired pulmonary function.

Keywords: FEV1/FVC, Pedicab, Food protein intake

Submitted: 26 July 2020 **Accepted**: 24 August 2020 **DOI**: https://doi.org/10.25026/jtpc.v5i3.266

1. Introduction

At present air pollution in urban areas is becoming a serious problem, including in the city of Surabaya. Some of the problems that cause a decrease in air quality are increased use of motor vehicles and energy consumption in cities [1,2]. Vehicle emission and fine dust can cause lung dysfunction, furthermore Continuous pollution exposure can cause chronic obstructive pulmonary disease (COPD) [3]. COPD is a chronic lung disease characterized by progressive airflow obstruction in the airways and is usually caused by harmful gases or particles. COPD is strongly influenced by environmental conditions, age, cigarette smoke, and genetics [4]. Someone who has health problems of lung dysfunction will be more at risk of suffering from COPD disease if

exposed to dangerous dust and vehicle fumes in carrying out their work. Because COPD risk factors are increasing day by day, knowledge of COPD disease is needed to reduce the impact and risk of COPD [3,5,6]. Pedicab drivers are one type of work that is at high risk of COPD because the work environment is directly exposed to vehicle dust and smoke on the road and generally has a smoking habit [7,8]. Pedal rickshaw drivers have a low economic status background, it is difficult to get access to hospitals, medicine, and food that causes pedicab rickshaw drivers are very vulnerable to malnutrition and malnutrition. Because urban rickshaw pullers come from a very poor economy with characteristics of chronic poverty [9,10].

COPD is also strongly associated with malnutrition. malnutrition plays an important role in the development and course of lung diseases such as COPD. Malnutrition is very common in people with low economic levels who find it difficult to get a nutritious and balanced food intake, this is why pedicab drivers are so vulnerable to COPD and also accompanied by malnutrition. Malnutrition in COPD caused by several factors, namely the increase in energy expenditure (EE) due to increased respiratory work, humoral factors that are influenced by systemic inflammation, and decreased appetite associated with IL-6 production. Decreased appetite affects the nutrients intake of COPD patients [11,12].

The mechanism of the occurrence of malnutrition in COPD patients due to the intake of nutrients, especially energy and protein requirements which is are not sufficient, while the energy needs of COPD patients increases for respiratory work. If this situation lasts a long time it will result in the dismantling of body tissue which is marked by a decrease in body mass index [13]. In COPD patients a high-protein diet is highly recommended to improve respiratory muscles and improve immune function. Lack of protein intake is very common in COPD patients so protein intake is one of the important things in COPD patients. Balanced protein intake improves lung function and the immune system of the body [11,14].

In this study the pedicab driver who has been affected by pulmonary dysfunction and who has not been compared to see how the effect of protein intake. Pulmonary function assessment in COPD patients themselves can be done by looking at the FEV1/FVC value by using a device called spirometry because of COPD obstruction in the airways, and this can be seen or known using this method [15,16]. Measurement of protein intake using the 24-hour recall method was chosen as a method of collecting prior food consumption data because the time and cost used are not too large but this method has a lower accuracy than other methods [17,18,19]. The purpose of this study was to determine the effect of protein intake consumed by pedicab drivers in the Surabaya area.

2. Experimental section

This research method used observational research using retrospective design and research material in the form of information from respondents obtained by question and answer (interview) directly. The independent variable of this study was lung function, and the dependent variable was protein intake. The research location used in this study was around the Surabaya area, which started from May until July 2019. The location of the study was carried out at the pedicab driver base on Wonokromo street, Mayjend Prof. Dr. Moestopo street, Rungkut Asri street, and Nginden street. Soponyono Market (Rungkut Asri street) has been used as a location for preliminary studies.

The pedicab driver referred to someone who rides traditional transportation with a modified bicycle which has three wheels and can accommodate several individuals as well as their luggage. Protein intake was the amount of protein that enters through daily food consumption that plays a role in the regulation and development of cells in the body. The method of measuring protein intake was the 24-hour recall method and referred to the adequacy rate of Indonesian protein consumption, which was 57 grams per capita a day [20]. Where if the protein consumption was ≥57g, could be said as sufficient protein intake, and if <57g was said to be lacking protein intake. The pulmonary function disorder criteria were FEV1/FVC value <70%, which indicated obstructive damage to the lungs. FEV1/FVC value <70% was classified as impaired pulmonary function group and if the FEV1/FVC value ≥70% was classified as a non-impaired pulmonary function group. In this study used spirometry with the Contec SP10 Hanheld brand that has been validated.

The population was the pedicab driver in Surabaya, East Java. The criteria sample were becoming a pedicab driver for at least 5 years because in the 5th year the initial symptoms of COPD have begun to appear [21]; Adult age>21

y.o; Heavy active smokers who consumed 21-30 cigarettes every day with an interval of smoking around 6-30 minutes after waking up in the morning; Having a disease that affects appetite or eating patterns (example: gastritis and toothache), and were undergoing fasting or certain diet programs. The sampling technique used was random sampling (non-probability sampling) with purposive sampling and consecutive sampling methods. In this study using the Lemeshow formula because the population was unknown or infinite, and the sample size in this study (n) a minimum of 62.

$$n = \frac{Z^2 P(1-P)}{d^2}$$

N : Number of population
D : degree of tolerable deviation (10%)
Z : The default value is normal (if α = 0.05, then Z = 1,960)
P (1 - P) : estimate the proportion of the population (if P = 0.5, then P(1-P)=0.09)

This study used the 24-hour recall method as an interview guide measuring food consumption in the preparation of interview questions. The 24-hour recall method is used to find out quantitative food consumption by checking it several times or several days so that it can provide an overview of the actual consumption of the respondents being examined. The 24-hour recall method is carried out three times but not in successive times, namely twice on workdays and once on holidays because the scheme can describe the variability of calorie and nutrient intake. In this study, respondents will be interviewed all about food and drinks consumed in the past 24 hours, including portion sizes with the help of a photograph of a household size, such as a spoon, plate, glass, or other sizes commonly used daily as stated in Food Photo Book [22], then the results are synchronized to an average intake per day. Data obtained in this study are primary data obtained directly from research subjects through direct dialogue (interviews).

After that, the data that has been obtained will be processed with one of Nutrisurvey program, which is software whose designation is for non-commercial use only this is useful for analyzing food nutrients from a menu or consumption survey. After the calorie intake data is collected, the data is entered into SPSS version 24, then a statistical analysis is performed. The data are presented descriptively, then published using a different test with Chi-Square to see the difference between protein intake with COPD and protein on pedicab drivers in the Surabaya area. A trial was conducted to find out whether there was a difference between the intake of protein consumed by a rickshaw driver and lung function.

3. Results and Discussion

In this study respondents were grouped into 2 groups: with lung function disorders, without lung function disorders, each of which was 62 respondents. A lung function test using spirometry was conducted to find out how the grouping of respondents, whether entered into a group with impaired lung function or entered into a non-impaired lung function group. To ascertain in which group the respondents will be classified based on the FEV1/FVC value, where if the FEV1/FVC value <70% and the FEV1 value was reduced more than the FVC value which indicates obstructive damage to the lungs [15,23].

The mean FEV1/FVC (%) in lung function impairment group was 49.14±7.18, and in without lung function impairment group was 73.56±4.21. The majority of the respondents included heavy smokers, 55.85% in the with impairment group and 84.61% in the without impairment group. On average, all respondents from both groups had smoked> 10 years and respondents often change types of cigarettes according to the availability and amount of income earned on that day.

Table 1. Characteristics of Respondents

Characteristics		lung function impairment group (n: 62)		without lung function impairment group (n: 62)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Age	Early elderly (46-55)	5	8.33	10	16.12
	Late elderly (56-65)	57	91.93	52	83.87
BMI (kg/m2)	Normal (18,5-24.9)	62	100	57	91.93
[24]	Overweight (25,0-<27)	0	0	5	8.06

Table 2. Profile of Protein From Food Comsumed by Lung Function

Food consumed	lung function impairment group (n: 62)				without lung function impairment group (n: 62)			
	n	Mean±SD	Min (g)	Max (g)	n	Mean±SD	Min (g)	Max (g)
White rice	62	6.69±0.54	6.00	7.20	62	7.12±0.51	6.50	7.20
Salted fish	58	2.80±0.95	2.00	3.90	45	2.80±1.50	3.00	3.90
Chili sauce	55	1.13±0.35	0.80	1.50	50	1.13V0.44	0.90	1.50
Vegetable Lodeh	55	1.04±0.29	0.60	1.30	43	1.04±0.32	0.60	1.30
Tempeh	48	6.40±1.87	5.10	12.0	45	9.10±2.10	5.10	12.0
Clear vegetables	47	0.49±0.10	0.40	0.60	49	0.52±0.15	0.50	0.60
Catfish	45	6.39±2.20	4.40	10.4	46	6.39±3.10	6.10	10.4
Coffee	45	3.70±3.7	1.00	5.00	49	0.50±0.18	0.50	0.60
Tamarind vege soup	45	1.02±0.31	0.50	1.30	47	1.02±0.41	0.50	1.30
Pindang fish	39	5.11±3.40	2.30	9.10	45	5.11±4.20	5.20	9.10
Tofu	37	3.80±1.24	2.20	5.10	41	4.20±1.27	3.20	5.10
Chicken meat	25	14.02±7.19	8.10	26.9	50	17.12±8.11	15.10	26.9

In these two groups, the most common was age 56-65 years in the lung function impairment (57 of 62) and without lung function impairment (52 of 62) groups (Table 1). The different test results obtained were equal to p(0.637)>0.05, indicating that there were no differences in the age characteristics of the pulmonary dysfunction group and the non-pulmonary function impairment group. With increasing age, a person would be more likely to decrease lung function. It is possible that as we age, accumulation of environmental exposure also increases, such as smoke, respiratory infections, air safety, and occupational dust [25]. Respiratory function and blood circulation will increase in childhood and reach a maximum at the age of 20-30 years, then it will decrease again according to age [26]. Age also affects the amount of protein adequacy, wherewith increasing age a person's appetite will decrease so that the level of daily protein intake will also decrease. Adequate intake is essential to improve pulmonary function and immune system, prevention of weight loss, and maintaining muscle mass and strength [13,27].

BMI can also affect lung function, states that as BMI increases, functional residual (FRC) and expiratory reserve volume (ERV) will also decrease exponentially so that obese people will very often breathe at vulnerable residual volumes. Weight gain and rising BMI are associated with decreases in lung volumes, which are reflected by a more restrictive ventilatory pattern on spirometry [28].

In the lung function impaired group found several types of food that is often consumed, namely white rice (all), vegetables lodeh (55 of 62), chili sauce (55 of 62) and salted fish (58 of 62). While in without lung function impaired group, the most were white rice (all), chili sauce (50 of 62), and chicken meat (50 of 62). The result showed the interviews for 3 days with 24-hour recall and obtained an average daily protein intake in 62 respondents with lung function disorders where the minimum average value was 42.07g and the maximum average value was 60.97g. While in the group of respondents without impaired pulmonary function, the minimum average value was 50.57 g and the maximum average value was 63.7.

In this study using the method remember 24 hours, measurements of height and weight, BMI, and lung function of respondents. Where data is taken 2 times on weekdays and 1 time on holidays/weekends then interviewed about respondents' consumption responses 24 hours backward. In retrieving data with this method there are some difficulties experienced by responding that often forget about the type of food consumed, so it must help to remember again. If the respondent still forgets about the type of food to be taken, the data collection day for the respondent will be replaced where the respondent considers and studies the type of food consumed.

There were 5 types of food most frequently consumed by respondents of the lung function impairment group and the non-lung function impairment group: white rice, lodeh vegetables, salted fish, chili sauce, tempeh. Each type of food consumed has an effect related to the respondent's protein intake such as rice where this type of food was never absent for the two types of groups. Rice has a variety of types and amounts of protein, states that there are differences in the amount of protein in each type of rice, such as white rice with an amount of 7.2g protein, 6.3g uduk rice, and 10.3g fried rice. But there is a limitation in this research related to the type of food menu that can not be clearly known. Likewise with tempeh, in this study, unknown types of tempeh consumed from what type of tempeh. How to cook, how long the food also affects the total protein consumed, because the rice that has just been cooked the amount of protein

and calories are different from the rice that has been left for days [29], as well as the types of fried foods such as Tempeh, unknown cooking oil used branded and what can be obtained from only tempeh, in general, that is input into a recall was 50 g of tempeh contain 6 g protein [30]. These things are a small part of the limitations of this study.

Table 3. Distribution of Large Frequency of Protein in Respondents

Food Protein Intake consumed		lung function impairment group (n: 62)	without lung function impairment group (n: 62)
Large Protein per day (g):	1st Recall	51.16	61.51
	2nd Recall	50.77	62.43
	3rd Recall	49.25	58.59
	Average	50.39	60.84
AKP* Classification (person):	Less	5	3
	Adequate	57	59

1st and 2nd recall done on weekdays
3rd Recall: Recall made on a holiday
*) Protein intake level is based on Indonesia's daily protein adequacy rate ie 57.00 grams per day [24]

Table 3 showed that protein intake was higher during weekdays than holidays in both groups. Average protein intake in the without lung function impairment group (60.84g) compared to the lung function impairment group (50.39g). Whereas based on the AKP classification, most respondents in both groups have adequate levels of protein intake. Based on the results of the calculation of the Difference 2 test, the average data presented get the Asymp Sig value was p(0.0000)<0.05 which indicates that there was a significant difference between the protein intake of the with and without lung function impairment group.

4. Conclusion

There was a significant difference between daily food protein intake in the pedicab rickshaw driver group with and without lung function impairment group.

References

[1] Zhang K, Batterman S. 2013. Air pollution and health risks due to vehicle traffic. *Sci Total Environ*, 0, pp.307-316.

[2] Ghorani-Azam A, Riahi-Zanjani B, Balali-Mood M. 2016. Effects of air pollution on human health and practical measures for prevention in Iran. *J Res Med Sci*, 21, pp.65.

[3] Kurt OK, Zhang J, Pinkerton KE. 2016. Pulmonary health effects of air pollution. *Curr Opin Pulm Med*, 22(2), pp.138-143.

[4] GOLD (Global Initiated For Chronic Lung Disease)., 2018. *Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease (2018 Report)*. Global Initiative for Chronic Obstructive Disease, Inc, USA.

[5] Vijayan, V.K., 2013. Chronic obstructive pulmonary disease. *Indian J Med Res*, 137(2), pp.251-269.

[6] Jiang. X.Q., Mei, X.D., Feng, D., 2016. Air pollution and chronic airway diseases: what should people know and do?. *J Thorac Dis*, 8(1), pp.E31-E40.

[7] Lorensia, A., Suryadinata, R.V., Diputra, I.N.Y., 2019. Risk Factors and Early Symptoms Related to Respiratory Disease in Pedicab in Surabaya. KEMAS, 15(2), pp.224-235.;

[8] Baker, S.P., Wong, J., Baron, R.D., 1976. Professional drivers: protection needed for a high-risk occupation. *Am J Public Health*, 66(7), pp.649–654.

[9] Islam, M.S., Podder, R.K., Haque, M.S., Alam, M.K., 2016. Socio economic profile of selected rickshaw puller at hugra union in tangail district, Bangladesh. *MOJ Public Health*, 4(5), pp.161–167.

[10] Begum, S., Sen, B., 2004. *Unsustainable Livelihoods, Health Shocks and Urban Chronic Poverty: Rickshaw Pullers as a Case Study*, Chronic Poverty Research Centre Working Paper 46, Bangladesh Institute of Development Studies, Dhaka (November). Downloaded from: http://www.chronicpoverty.org/pdfs/46$20Begum_Sen.pdf.

[11] Peter, F.C., Ian, A.Y., Yuan-Chin, C., Annalicia, V., 2019. Nutritional support in chronic obstructive pulmonary disease (COPD): an evidence update. *J Thorac Dis*, 11(Suppl 17), pp.S2230–S2237.

[12] Itoh, M., Tsuji, T., Nemoto, K., Nakamura, H., Aoshiba, K., 2013. Undernutrition in patients with COPD and its treatment. *Nutrients*, 5(4), pp.1316-1335.

[13] Yazdanpanah, L., Shidfar, F., Moosavi, A.J., Heidarnazhad, H., Haghani, H., 2010. Energy and protein intake and its relationship with pulmonary function in chronic obstructive pulmonary disease (COPD) patients. *Acta Med Iran*, 48(6), pp.374-379.
[14] Rawal, G., Yadav, S., 2015. Nutrition in chronic obstructive pulmonary disease: A review. *J Transl Int Med*, 3(4), pp.151-154.
[15] Johns, D.P., Walters, J.A., Walters, E.H., 2014. Diagnosis and early detection of COPD using spirometry. *J Thorac Dis*, 6(11), pp.1557-1569.
[16] Ranu, H., Wilde, M., Madden, B., 2011. Pulmonary function tests. *Ulster Med J*, 80(2), pp.84-90.
[17] Lorensia, A., Wahyudi, M., Yudiarso, A., 2018. *Efek Minyak Ikan pada Asma*. Mojokerto: STIKes Majapahit.
[18] Freedman, L.S., Commins, J.M., Willett, W., Tinker, L.F., Spiegelman, D., Rhodes, D., Potischan, N., Neuhouser, M.L., Moshfegh, A.J., Kipnis. V., Baer. D.J., Arab, L., Prentice, R.L., Subar, A.F., 2017. Evaluation of the 24-Hour Recall as a Reference Instrument for Calibrating Other Self-Report Instruments in Nutritional Cohort Studies: Evidence From the Validation Studies Pooling Project. *Am J Epidemiol*. 186(1), pp.73-82.
[19] Wark, P.A., Hardie, L.J., Frost, G.S., et al., 2018. Validity of an online 24-h recall tool (myfood24) for dietary assessment in population studies: comparison with biomarkers and standard interviews. *BMC Med*, 16(1), pp.136.
[20] BPS, 2017, Badan Pusat Statistik.
[21] Kelly, F.J., 2014. Influence of Air Pollution on Respiratory Disease. *European Medical Journal*, 2, pp.96-103.
[22] Kemenkes RI, 2014. *Situasi dan analisis lanjut usia*.
[23] Chung, K.S., Jung, J.Y., Park, M.S., Kim. Y.S., Kim, S.K., Chang, J., Song, J.H., 2016. Cut-off value of FEV1/FEV6 as a surrogate for FEV1/FVC for detecting airway obstruction in a Korean population. *Int J Chron Obstruct Pulmon Dis*, 11, pp.1957-1963.
[24] Kemenkes RI, 2013. *Angka Kecukupan Gizi Yang Dianjurkan Bagi Bangsa Indonesia*.
[25] Vaz, F.C.A., Gill, T.M., 2012. Respiratory impairment and the aging lung: a novel paradigm for assessing pulmonary function. *J Gerontol A Biol Sci Med Sci*, 67(3), pp.264-275.
[26] Saikia, D., Mahanta, B., 2019. Cardiovascular and respiratory physiology in children. *Indian J Anaesth*, 63(9), pp.690-697.
[27] Lonnie, M., Hooker, E., Brunstrom, J.M., Corfe, B.M., Green, M.A., Watson, A.W., Willams, E.A., Stevenson, E.J., Person, S., Johnstone, A.M., 2018. Protein for Life: Review of Optimal Protein Intake, Sustainable Dietary Sources and the Effect on Appetite in Ageing Adults. *Nutrients*, 10(3), pp.360.
[28] Zammit, C., Liddicoat, H., Moonsie, I., Makker, H., 2010. Obesity and respiratory diseases. *Int J Gen Med*, 3, pp. 335-343.
[29] Akilen, R., Deljoomanesh, N., Hunschede, S., Smith, C.E., Arshad, M.U., Kubant, R., Anderson, G.H., 2016. The effects of potatoes and other carbohydrate side dishes consumed with meat on food intake, glycemia and satiety response in children. *Nutr Diabetes*, 6(2), e195.
[30] Kemenkes RI, 2014. Pedoman Gizi Seimbang.