



RESEARCH ARTICLE

Effect of lung function disorders and physical activity on smoking and non-smoking students

AMELIA LORENSIA¹, CYNTHIA MARISCA MUNTU², RIVAN VIRLANDO SURYADINATA³, ROSLIN SEPTIANI⁴¹ Department of Clinical-Community Pharmacy, Faculty of Pharmacy, Universitas Surabaya (UBAYA), Indonesia;² Department of Pharmaceutical, Faculty of Pharmacy, Universitas Surabaya (UBAYA), Indonesia;³ Department of Public Health, Faculty of Biotechnology, Universitas Surabaya (UBAYA), Indonesia;⁴ Bachelor Student of Faculty of Pharmacy, Faculty of Pharmacy, Universitas Surabaya (UBAYA), Indonesia

Keywords

Physical activity • Lung function • Smokers • Non-smokers • Spirometry

Summary

Background. The number of young smokers is increasing, and hence their risk of respiratory problems. This risk is exacerbated by their low level of physical activity, which also reduces lung function. This study aimed to determine differences in lung function and levels of physical activity between smokers and non-smokers.

Method. This research was conducted from October 2019 to January 2020. The research design was cross-sectional, and a purposive sampling method was used. Pulmonary function was measured by means of spirometry, while physical activity was measured through a modified International Physical Activity Questionnaire (IPAQ).

Results. We enrolled 124 university students: 62 smokers and 62 non-smokers. A significant difference in lung function values (< 70 vs ≥ 70) was observed between smokers and non-smokers ($p = 0.00$). No difference ($p = 0.907$) in the level of physical activity was seen between smokers and non-smokers, with most subjects in both groups displaying moderate levels.

Conclusions. Students who smoked had more respiratory problems than those who did not. Although the level of physical activity did not correlate with respiratory problems, these problems were more common in the vigorous category.

Introduction

Lung dysfunction is one of the top five causes of death due to non-communicable diseases in Indonesia [1]. Lung function disorders are closely related to smoking. Indonesia has the third largest cigarette consumption in the world [2], and smoking is common among people of all ages, especially the young ones. Most teenagers have already consumed cigarettes, and many are habitual smokers [3]. Students who smoke admit that they are aware of the harmful effects of smoking on health, but they still ignore these effects, claiming to be “less certain” of the dangers of smoking.

Cigarettes contains nicotine, tar and carbon monoxide [4]. Nicotine and carbon monoxide in the bloodstream thicken the blood and narrow the arteries. Moreover, the tar contained in cigarettes can coat the lung tissues and reduce the elasticity of the air sacs, making breathing difficult [5]. Lung volume is measured to evaluate the normality of respiratory function [3]. A tool that is commonly used for this purpose is spirometer, which measures the forced expiratory volume in the first second (FEV1) and the forced vital capacity (FVC) [6]. Many students say that they do not have enough time to do physical activities, as they think that the time devoted to such activities would reduce the time available for learning. What they do not realize, however, is that physical exercise can have beneficial effects on their cognitive ability (attention, memory, concentration) and maintain mental health [7, 8]. In 2013, 26.1% of Indonesians were classified as having an insufficient level of physical activity.

By 2018, this percentage had risen to an estimated 33.5%. Similarly, in East Java, the prevalence of people who did not do physical activity was around 28.5%. Various studies have reported that people of all ages in almost all countries are too sedentary [9]. According to Basic Health Research, the prevalence data show that many people do not engage in physical activity, despite its importance for health. Physical activities have beneficial effects on the respiratory system [10], improving lung function [11] and increasing the vital capacity. Indeed, an individual who takes regular physical exercise can train the respiratory muscles, with the result that a greater volume of oxygen can enter the pulmonary capillaries, and lungs capacity increases [12-14]. Moreover, intense physical activity can reduce systemic and bronchial inflammation, improving both lung function and quality of life [15].

Previous studies have found that smokers are physically less active than non-smokers [16, 17]. The present study investigated the effect of impaired lung function and physical activities in smoking and non-smoking students. The questionnaire used to measure physical activities was adapted from the International Physical Activity Questionnaire (IPAQ) [18, 19]. In order to measure lung function, a handheld spirometer was used. A handheld device was chosen because it was light and easy to carry, and because the results would be immediately available. Previous research conducted in Jordan by Banur et al. [20] and Nawafleh et al. [21] found that smokers and non-smokers differed in terms of their lung function (FEV1/FVC).

Method

RESEARCH DESIGN

The research design was cross-sectional. Data were collected through questionnaires administered from November 2019 to January 2020 in Surabaya. The ethics committee of the University of Surabaya approved the study protocols (No. 120/KE/XII/2019).

RESEARCH VARIABLE

In this study, the independent variables were smokers and non-smokers, while the dependent variables were lung function and physical activities. Impaired lung function was defined as an FEV1/FVC value less than 0.7 [22]. Lung function was tested by means of the Contec SP10 Spirometer.

Physical activity is any activity or movement carried out by the body as a result of energy expenditure by the skeletal muscles [23]. The questionnaire referred to physical activity carried out during the course of a week. Respondents were divided into categories according to their physical activity: Mild Physical Activity (< 600 METs), Moderate Physical Activity (600-1,500 METs), and Vigorous Physical Activity (> 1,500 METs) [24]. In this study, the intensity of physical activity was measured in METs (metabolic equivalents of task). Physical activities were calculated by means of the METs level (physical activity intensity) multiplied by the length of time (minutes) spent on the activity in a week [18, 19].

POPULATION AND SAMPLE RESEARCH

The study population consisted of male students attending a private university in Rungkut sub-district, Surabaya. The inclusion criteria were: age > 18 years and absence of respiratory or cardiovascular diseases which might affect the measurement of lung function and physical activities. A purposive sampling method was used.

DATA COLLECTION

Subjects who stated that they were willing to participate in the study and filled in the informed consent form were immediately asked to complete a physical activity

questionnaire consisting of the modified IPAQ questions; their lung function was then measured by means of spirometry.

DATA ANALYSIS

Differences in lung function and physical activity between smokers and non-smokers were determined by means of the chi-square test. Subjects were described in terms of age and body mass index (BMI).

Results

Subjects were grouped according to sex, age and treatment history. Table I shows the number of respondents (124), subdivided into non-smokers (62) and smokers (62).

In the group of smokers, the degree of smoking was assessed by means of the Brinkman index, which is calculated by multiplying the number of cigarettes smoked per day by the duration of smoking in years [26]. The index has 3 categories: light smokers (0-199), moderate smokers (200-600), and heavy smokers (> 600) [26]. All our smokers fell into the light category and smoked filter cigarettes of various brands (62 of 62).

The results of lung function testing are shown in Table II. Most of the subjects (42 of 62 smokers and 60 of 62 non-smokers) did not experience respiratory problems, though the results of the chi-square test revealed a significant difference ($p = 0.00$) between the two groups.

The profile of the physical activities carried out by the subjects is shown in Table III. Physical activity was divided into 3 categories: mild (< 600 MET-minutes/week), moderate (600-1500 MET-minutes/week) and vigorous (> 1,500 MET-minutes/week). Most of the subjects (26 smokers and 27 non-smokers) reported moderate levels of physical activity. The chi-square test results showed no difference ($p = 0.907$) in the level of physical activity between smokers and non-smokers (Tab. IV).

Tab. V shows that almost one third of the smokers (20/62) had respiratory problems, and that more than half of these (11/20) engaged in moderate physical activity. Only 2 of the non-smokers had respiratory problems, both of whom were in the light activity category).

Tab. I. Frequency distribution of characteristics.

Respondents' characteristics		Smokers (n: 62)		Non-smokers (n: 62)	
		Number	Percentage (%)	Number	Percentage (%)
Age (years)	18-19	8	12.90	12	19.35
	20-21	17	27.42	21	33.87
	22-23	22	35.48	25	40.33
	24-25	15	24.20	4	6.45
BMI (kg/m ²) [25]	Underweight (< 18.5)	10	16.31	9	14.52
	Normal (18.5 ≤ 25)	47	75.81	45	72.58
	Overweight (25 ≤ 27)	3	4.84	2	3.23
	Overweight (≥ 27)	2	3.23	6	9.68

BMI: Body Mass Index.

Tab. II. Lung function values in smokers and non-smokers.

Lung function value		Smoker group (n: 62)		Non-smoking group (n: 62)		P value
		Frequency	Percentage (%)	Frequency	Percentage (%)	
FEV1/FVC value (%)	< 70 (with respiratory problems)	20	32.26	2	3.23	0.00
	≥ 70 (without respiratory problems)	42	67.74	60	96.77	

Tab. III. Profile of type of physical activity.

N.	Type of physical activity	Duration (minutes)	Smokers (n: 62)		Non-smokers (n: 62)	
			Number	Percentage (%)	Number	Percentage (%)
1	Walking 100 m	5	3	4.84	1	1.61
		10	5	8.06	3	4.84
		15	7	11.30	26	41.94
		20	3	4.84	2	3.23
		30	26	41.94	11	17.74
		40	1	1.61	0	0
		60	17	27.42	16	25.81
	Not done	0	0	3	4.84	
2	Walking > 100 m	10	1	1.61	5	8.06
		15	6	9.68	11	17.74
		30	18	29.03	13	20.97
		40	1	1.61	0	0
		45	2	3.23	1	1.61
		60	23	37.10	23	31.10
		120	2	3.23	0	0
	Not done	9	14.52	9	14.52	
3	Driving vehicles (cars, motorbikes)	10	1	1.61	0	0
		15	5	8.06	2	3.23
		20	1	1.61	5	8.06
		30	6	9.68	6	9.68
		35	3	4.84	0	0
		60	21	33.87	19	30.64
		120	10	16.13	13	20.97
		180	3	4.84	7	11.29
		240	6	9.68	4	6.45
	Not done	6	9.68	3	4.84	
4	Cycling	10	2	3.23	1	1.61
		30	2	3.23	3	4.84
		60	4	6.45	1	1.61
		120	1	1.61	2	3.23
		180	2	3.23	1	1.61
		Not done	51	82.26	54	87.10
5	Cooking	10	4	6.45	10	16.13
		15	3	4.84	7	11.29
		30	7	11.29	6	9.68
		60	3	4.84	4	6.45
		Not done	45	72.58	35	56.45
6	Washing	5	1	1.61	3	4.84
		10	2	3.23	6	9.68
		15	6	9.68	3	4.84
		30	10	16.13	13	20.98
		60	10	16.13	8	12.90
		120	2	3.23	3	4.84
		Not done	31	50.00	26	41.93

Continues

Follows

Tab. III. Profile of type of physical activity.

N.	Type of physical activity	Duration (minutes)	Smokers (n: 62)		Non-smokers (n: 62)	
			Number	Percentage (%)	Number	Percentage (%)
7	Sweeping, cleaning room /house	5	6	9.68	6	9.68
		10	11	17.74	11	17.74
		15	4	6.45	6	9.68
		30	5	8.06	21	33.87
		60	10	16.13	4	6.45
		120	1	1.61	3	4.84
		Not done	25	40.32	11	17.74
8	Carrying water	1	0	0	11	17.74
		2	24	38.71	14	22.58
		4	0	0	11	17.74
		10	8	12.90	8	12.90
		Not done	30	48.39	18	29.03
9	Playing football	10	1	1.61	0	0
		30	1	1.61	4	6.45
		45	1	1.61	0	0
		60	17	27.42	5	8.06
		120	10	16.13	8	12.90
		Not done	32	51.61	45	72.58
10	Playing volleyball	60	2	3.23	4	6.45
		120	2	3.23	1	1.61
		Not done	58	93.53	57	91.94
11	Playing badminton	60	9	14.52	5	8.06
		120	1	1.61	5	8.06
		180	2	3.23	2	3.23
		Not done	50	80.64	50	80.64
12	Swimming	30	2	3.23	4	6.45
		60	1	1.61	0	0
		120	5	8.06	5	8.06
		Not done	54	87.10	53	85.48
13	Cleaning the garden, burning trash	10	1	1.61	5	8.06
		20	2	3.23	0	0
		30	2	3.23	2	3.23
		60	1	1.61	2	3.23
		120	2	3.23	1	1.61
		Not done	54	87.10	52	83.87
14	Playing musical instrument	15	1	1.61	1	1.61
		30	7	11.29	2	3.23
		60	4	6.45	3	4.84
		120	1	1.61	1	1.61
		180	1	1.61%	0	0
		Not done	48	77.42	53	85.48
15	Gymnastics/aerobics	10	0	0	1	1.61
		25	0	0	1	1.61
		30	0	0	5	8.06
		60	0	0	1	1.61
		90	0	0	1	1.61
		120	0	0	2	3.23
		150	0	0	1	1.61
		Not done	62	100	50	80.165

Discussion

Most subjects, whether smokers or non-smokers, did not experience respiratory problems (Tab. II). This was probably due to their young age, in that their exposure to

cigarette smoke had not yet impaired their lung function. Nevertheless, a significant difference ($p = 0.00$) was seen between the two groups in terms of lung function values. The results of the present study are similar to those of the research conducted in Jordan by Banur et al. [20] and

Tab. IV. Physical activity of smokers and non-smokers.

Physical activity classification		Smokers (n:62)		Non-smokers (n:62)		P value
		Number	Percentage (%)	Number	Percentage (%)	
Category	Light	14	22.58	12	19.35	0.907
	Moderate	26	41.94	27	43.55	
	Vigorous	22	35.48	23	37.10	
Total		62	100	62	100	

Tab. V. Cross-tabulation of lung function values and physical activity levels in smokers and non-smokers.

Physical activity classification		Smokers (n: 62)		Non-smokers (n: 62)		Total
		With respiratory problems	Without respiratory problems	With respiratory problems	Without respiratory problems	
Category	Light	9	5	10	2	26
	Moderate	15	11	27	0	53
	Vigorous	18	4	23	0	45
Total		42	20	60	2	124

Nawafleh et al. [21], who also observed differences in lung function (FEV1/FVC) between smokers and non-smokers. Cigarettes contain harmful chemicals, such as carbon monoxide, which can enter the bloodstream and bind hemoglobin. Hemoglobin should bind to oxygen. However, when the carbon monoxide content exceeds that of oxygen, it binds the hemoglobin. This can disrupt the pulmonary blood vessels, which become narrower and less elastic, causing the lungs to expand [27]. In this study, lung function was measured by means of hand-held spirometers, which are small, portable and inexpensive. Moreover, spirometry results can be screened simply and accurately [22].

Several factors can affect lung function:

- *age*: lung function tends to decline with aging [28]. Lung function continues to increase up to the age of 25 years, and then remains stable for approximately 5-10 years. Subsequently, lung function begins to decrease after the age of about 40 years [29, 30]. Indeed, with aging, the muscles of the diaphragm decrease, and the lung tissue that helps keep the ducts open can lose elasticity, reducing the caliber of the airways [31];
- *gender*: pulmonary development continues throughout childhood and adolescence [32]. Women's lungs are smaller than men's, and have fewer bronchioles [33]. For this reason, and because most smokers are male [34], we enrolled only male subjects in the present study;
- *smoking*: cigarette smoke contains around 4,000 chemical compounds, more than 100 of which are carcinogenic and mutagenic and harmful to health [35]. The damage caused depends on the length of exposure; the longer the exposure, the greater the effect will be [36]. Thus, over time, the lung function of a smoker will deteriorate in comparison with that of a non-smoker [37]. According to some studies, many people think

that light smoking has no harmful effects. In one such study, however, it was found that former smokers and those who smoked less than 5 cigarettes per day had already done moderate damage to their lungs, and that, in two-thirds of cases, chronic obstructive pulmonary disease (COPD) could well ensue [38]. Light smoking can impair lung function within 1 year, while heavy smokers can suffer the same effect within 9 months.

The respondents involved in this study smoked filter cigarettes of different brands and with different levels of nicotine and tar. However, the cigarette brand did not affect the results of the study. Indonesian Government Regulation number 81 of 1999, regarding smoking and health, states that cigarettes are allowed to contain no more than 1.5 mg of nicotine and 20 mg of tar. The filters used in cigarettes can significantly reduce the tar and nicotine content of the smoke. According to previous research, the nicotine content in unfiltered cigarette smoke is greater than that of filtered cigarette smoke [38, 39];

- *physical activity*: regular physical activity increases respiratory efficiency, improving the functioning both of the lungs and of the other organs of the body. Swimming and gymnastics are particularly beneficial, the latter being an aerobic exercise that can easily be performed [40, 41].

This study involved respondents aged 18-25 years, which means that their lung function was still maturing [30]. If smoking begins at that age or less, it can have serious consequences and may be a risk factor for COPD [42]. In the present study, all subjects were less than 60 years old, and none were classified as geriatric (Tab. I). Thus, the age factor did not affect our results. BMI can also affect the functioning of the lung, and respiratory dysfunction due to obesity can affect FVC and FEV1 [43]. However, as most of our respondents had normal BMI values (Tab. I), the BMI factor did not affect this study.

The study involved 124 subjects, who were equally divided into 2 groups: smokers and non-smokers. We chose to enroll male students, since previous research has indicated that men are physically more active than women [44]. As shown in Tables IV and V, 26 smokers (41.94%) engaged in moderate physical activity; 22 (35.48%) in vigorous activity, and 14 (22.58%) in light activity. Similarly, 27 non-smokers (43.55%) engaged in moderate physical activity, 23 (37.10%) in vigorous activity, and 10 (19.35%) in light activity. Research conducted by Kwan et al. [45] has shown that physical activity tends to decline among young adults, particularly university students.

Physical activity has various beneficial effects on health, such as maintaining/losing body weight, strengthening bones and muscles, and reducing depression and stress. It can also prevent several diseases, including heart disease and stroke, and reduce the risk of high blood pressure, diabetes and several cancers, such as breast and colon cancers [46, 47].

The five physical activities most frequently carried out by the participants in our study were: walking more than 100 m; driving vehicles (cars, motorbikes); washing; sweeping and cleaning rooms/houses; carrying water. This study involved respondents aged 18-25 years. They can at least perform physical activities for 150 minutes at moderate intensity throughout the week, or perform physical activities for 75 minutes with heavy intensity throughout the week, or a combination of moderate activity and strenuous activity (Not clear. Perhaps you mean: The WHO recommends that such subjects carry out moderate-intensity physical activity for at least 150 minutes per week, or strenuous activity for 75 minutes, or a combination of moderate and strenuous activity) [23]. In the present study, the physical activity carried out by both smokers and non-smokers was of moderate intensity. Several factors can act upon a person's physical activity [48], including:

- *intrinsic factors*: these refer to the person's internal motivation, and are often connected with the good or bad feelings elicited by physical activity;
- *environmental factors*: the individual's surroundings, including the weather, can encourage or discourage physical activity;
- *physical considerations*: those who take regular physical exercise tend both to look and to feel good; they will therefore be motivated to continue their physical activity. Conversely, tiredness and lack of fitness will discourage physical activity;
- *routine factors*: the routine necessities of everyday life will obviously impact on the time and energy that an individual is able or willing to devote to physical activities.

Physical activity can be measured by means of accelerometers and pedometers and through self-report questionnaires (IPAQ-S, RPAQ, PAR). In this study, we used only self-report questionnaires, which have the advantage of being economical and easy to administer; admittedly, however, the data obtained will depend on what respondents remember [49].

The present study has some limitations. Firstly, the sample was relatively small. Secondly, smoking habits and the intensity and duration of the various physical activities were referred subjectively. However, the answers to types of physical activity such as carrying water were clear, i.e. lifting large 19 L water containers or medium-sized 10 L containers. Finally, in establishing the exclusion criteria, information on medical history was provided only by the respondents themselves and a complete medical examination was not carried out.

Conclusions

Most subjects (60/62 non-smokers and 42/62 smokers) had no respiratory problems, though the chi-square test results showed a significant difference ($p = 0.00$) between the two groups in terms of lung function values (< 70 vs ≥ 70). Most subjects (26/62 smokers and 27/62 non-smokers) had moderate levels of physical activity. The chi-square test results showed no difference ($p = 0.907$) between smokers and non-smokers in terms of their level of physical activity.

Acknowledgements

Funding sources: this research was funded by the Institute of Research and Community Service of the Universitas Surabaya.

Conflicts of interest statement

The authors declare no conflict of interest.

Authors' contributions

All authors discussed the results and contributed to the final manuscript.

References

- [1] Kementerian Kesehatan Republik Indonesia. Penyakit Tidak Menular (PTM) Penyebab Kematian Terbanyak di Indonesia; 2011. Available from: <https://www.kemkes.go.id/article/view/1637/penyakit-tidak-menular-ptm-penyebab-kematian-terbanyak-di-indonesia.html>
- [2] Kementerian Kesehatan RI. INFODATIN: Pusat Data dan Informasi Kementerian Kesehatan RI; 2018. Available from: <https://pusdatin.kemkes.go.id/folder/view/01/structure-publikasi-pusdatin-info-datin.html>
- [3] Tantisuwat A, Thaveeratitham P. Effects of smoking on chest expansion, lung function, and respiratory muscle strength of youths. *J Phys Ther Sci* 2014;26:167-70. <https://doi.org/10.1589/jpts.26.167>
- [4] Morgan JC, Byron MJ, Baig SA, Stepanov I, Brewer NT. How people think about the chemicals in cigarette smoke: a systematic review. *J Behav Med* 2017;40:553-64. <https://doi.org/10.1007/s10865-017-9823-5>
- [5] Durmic T, Lazovic B, Djelic M, Lazic JS, Zikic D, Zugic V,

- Dekleva M, Mazic S. Influências específicas do esporte nos padrões respiratórios em atletas de elite. *J Bras Pneumol* 2015;41:516-22.
- [6] Cheung HJ, Cheung L. Coaching patients during pulmonary function testing: a practical guide. *Can J Respir Ther* 2015;51:65-8.
- [7] Hyndman B, Lecturer S. Move it, Move it: how physical activity at school helps the mind (as well as the body). *The Conversation*; 2018. Available from: <https://theconversation.com/move-it-move-it-how-physical-activity-at-school-helps-the-mind-as-well-as-the-body-100175>
- [8] Liposek S, Planinsec J, Leskosek B, Pajtler A. Physical activity of university students and its relation to physical activity of university students and its relation to physical fitness and academic. *Annales Kinesiologiae* 2019;9:89-104.
- [9] Jajat, Sul-toni K, Suherman A. Barriers to physical activity on university student. *IOP Conf. Ser.: Mater Sci Eng* 2017;180:1-4.
- [10] Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. *Applied Physiology, Nutrition and Metabolism* 2010;35:725-40.
- [11] Luzak A, Karrasch S, Thorand B, Nowak D, Holle R, Peters A, Schulz H. Association of physical activity with lung function in lung-healthy German adults: results from the KORA FF4 study. *BMC Pulm Med* 2017;17:215. <https://doi.org/10.1186/s12890-017-0562-8>
- [12] Álvarez-Herms J, Julià-Sánchez S, Corbi F, Odriozola-Martínez A, Burtscher M. Putative role of respiratory muscle training to improve endurance performance in hypoxia: a review. *Front Physiol* 2019;9:1970. <https://doi.org/10.3389/fphys.2018.01970>
- [13] Okrzymowska P, Kurzaj M, Seidel W, Rożek-Piechura K. Eight weeks of inspiratory muscle training improves pulmonary function in disabled swimmers-a randomized trial. *Int J Environ Res Public Health* 2019;16:1747. <https://doi.org/10.3390/ijerph16101747>
- [14] Hernández-Álvarez, Edgar Debray, Guzmán-David, Cristian Arvey, Ruiz-González, Juan Carlos, Ortega-Hernández, Ana María, & Ortiz-González, Deisy Carolina. Effect of a respiratory muscle training program on lung function, respiratory muscle strength and resting oxygen consumption in sedentary young people. *Revista de la Facultad de Medicina* 2018;66:605-10.
- [15] Loponen J, Ilmarinen P, Tuomisto LE, Niemelä O, Tammola M, Nieminen P, Lehtimäki L, Kankaanranta H. Daily physical activity and lung function decline in adult-onset asthma: a 12-year follow-up study. *Eur Clin Respir J* 2018;5:1533753. <https://doi.org/10.1080/20018525.2018.1533753>
- [16] Heydari G, Hosseini M, Yousefifard M, Asady H, Baikpour M, Barat A. Smoking and physical activity in healthy adults: a cross-sectional study in Tehran. *Tanaffos* 2015;14:238-45.
- [17] Kaczynski AT, Manske SR, Mannell RC, Grewal K. Smoking and physical activity: a systematic review. *Am J Health Behav* 2008;32:93-110.
- [18] Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, Pratt M, Ekelund U, Yngve A, Sallis JF, Oja P. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 2003;35:1381-95. <https://doi.org/10.1249/01.MSS.0000078924.61453.FB>.
- [19] Perdana STS, Emy H, Rina S, Madarina J. Relative validity of administered Indonesian version of the Short-Form International Physical Activity Questionnaire (IPAQ-SF) among obese adolescent girl population. *Pakistan Journal of Nutrition* 2016;15:816-20.
- [20] Banur A, Dacosta AL, Wiseman MP, Chaudri S. A Study on effects of smoking on spirometry, thoracic gas volume and residual volume in apparently asymptomatic smokers. *IOSR Journal of Fental and Medical Sciences* 2016;15:48-54.
- [21] Nawafleh HA, Abo Zead SAS, Al-Maghairehc DF. Pulmonary function test: the value among smokers and nonsmokers. *Health Science Journal* 2012;6:703-71.
- [22] GOLD (Global Initiative for Chronic Obstructive Lung Disease); 2019. Available from: https://goldcopd.org/wp-content/uploads/2018/11/GOLD-2019-POCKET-GUIDE-FINAL_WMS.pdf
- [23] WHO. Physical Activity; 2020. Available from: https://www.who.int/dietphysicalactivity/factsheet_adults/en
- [24] Middleton R. What does “control” have to offer? *IEEE Control Syst* 2011;31:12-3.
- [25] Nuttall FQ. Body mass index: obesity, BMI and health: a critical review. *Nutr Today* 2015;50:117-28. <https://doi.org/10.1097/NT.0000000000000092>
- [26] Saito T, Miyatake N, Sakano N, Oda K, Katayama A, Nishii K, Numata T. Relationship between cigarette smoking and muscle strength in Japanese men. *J Prev Med Public Health* 2012;45:381-6. <https://doi.org/10.3961/jpmph.2012.45.6.381>
- [27] Harris JE. Cigarette smoke components and disease: cigarette smoke is far more than a triad of 'tar,' nicotine, and carbon monoxide. *NCI Smoking and Tobacco Control Monographs* 1996;7: 59-75.
- [28] Thomas ET, Guppy M, Straus SE, Bell KJL, Glasziou P. Rate of normal lung function decline in ageing adults: a systematic review of prospective cohort studies. *BMJ Open* 2019;9:e028150. <https://doi.org/10.1136/bmjopen-2018-028150>
- [29] Lorensia A, Wahyudi M, Yudianto A, Kurnia SED. Effect of illness perception on improving asthma symptoms with omega-3 fish oil therapy: pre-post design. *J Appl Pharm Sci* 2020;10:62-71.
- [30] Ostrowski S, Barud W. Factors influencing lung function: are the predicted values for spirometry reliable enough? *J Physiol Pharmacol* 2006;57(Suppl 4):263-71.
- [31] Roman MA, Rossiter HB, Casaburi R. Exercise, ageing and the lung. *Eur Respir J* 2016;48:1471-86. <https://doi.org/10.1183/13993003.00347-2016>
- [32] Carey MA, Card JW, Voltz JW, Arbes SJ Jr, Germolec DR, Korach KS, Zeldin DC. It's all about sex: gender, lung development and lung disease. *Trends Endocrinol Metab* 2007;18:308-13. <https://doi.org/10.1016/j.tem.2007.08.003>
- [33] Lomauro A, Aliverti A. Sex differences in respiratory function. *Breathe* 2018;14:131-40.
- [34] Lorensia A, Yudianto A, Pratama AM. Interpretative phenomenological analysis: pharmacy student perceptions of cigarette smoking of health awareness in smoking cessation. *ANIMA Indonesian Psychological Journal* 2016;31:170-9.
- [35] Suryadinata RV, Lorensia A, Sari RK. Differences in nutrition food intake and body mass index between smoker and non-smoker in adult. *Indonesian Journal of Clinical Pharmacy*. 2017;6:171-80.
- [36] Fitria, Triandhini RINKR, Mangimbukude JC, Karwur FF. Merokok dan Oksidasi DNA. *Sains Medika* 2013;5:113-20.
- [37] Tammola M, Ilmarinen P, Tuomisto LE, Haanpää J, Kankaanranta T, Niemelä O, Kankaanranta H. The effect of smoking on lung function: a clinical study of adult-onset asthma. *Eur Respir J*. 2016 Nov;48(5):1298-1306. <https://doi.org/10.1183/13993003.00850-2016>.
- [38] Oelsner EC, Balte PP, Bhatt SP, Cassano PA, Couper D, Folsom AR, Freedman ND, Jacobs DR Jr, Kalhan R, Mathew AR, Kronmal RA, Loehr LR, London SJ, Newman AB, O'Connor GT, Schwartz JE, Smith LJ, White WB, Yende S. Lung function decline in former smokers and low-intensity current smokers: a secondary data analysis of the NHLBI Pooled Cohorts Study. *Lancet Respir Med* 2020;8:34-44. [https://doi.org/10.1016/S2213-2600\(19\)30276-0](https://doi.org/10.1016/S2213-2600(19)30276-0)
- [39] Taghavi S, Khashyarmansh Z, Moalemzadeh-Haghighi H, Nasirli H, Eshraghi P, Jalali N, Hassanzadeh-Khayyat M. Nicotine content of domestic cigarettes, imported cigarettes and pipe tobacco in Iran. *Addict Health*. 2012 Winter-Spring;4(1-2):28-35. PMID: 24494133; PMCID: PMC3905555.
- [40] Font-Ribera L, Villanueva CM, Nieuwenhuijsen MJ, Zock JP, Kogevinas M, Henderson J. Swimming pool attendance, asthma, allergies, and lung function in the Avon Longitudinal Study

- of Parents and Children cohort. *Am J Respir Crit Care Med* 2011;183:582-8. <https://doi.org/10.1164/rccm.201005-0761OC>
- [41] Valeriani F, Protano C, Vitali M, Romano Spica V. Swimming attendance during childhood and development of asthma: meta-analysis. *Pediatr Int* 2017;59:614-21. <https://doi.org/10.1111/ped.13230>
- [42] Bhatt SP, Kim YI, Harrington KF, Hokanson JE, Lutz SM, Cho MH, DeMeo DL, Wells JM, Make BJ, Rennard SI, Washko GR, Foreman MG, Tashkin DP, Wise RA, Dransfield MT, Bailey WC; COPD Gene Investigators. Smoking duration alone provides stronger risk estimates of chronic obstructive pulmonary disease than pack-years. *Thorax* 2018;73:414-21. <https://doi.org/10.1136/thoraxjnl-2017-210722>
- [43] Mafort TT, Rufino R, Costa CH, Lopes AJ. Obesity: systemic and pulmonary complications, biochemical abnormalities, and impairment of lung function. *Multidiscip Respir Med* 2016;11:28. <https://doi.org/10.1186/s40248-016-0066-z>
- [44] Fagaras SP, Radu LE, Vanvu G. The level of physical activity of university students. *Procedia - Social and Behavioral Sciences*. 2015;197:1454-7.
- [45] Kwan MY, Cairney J, Faulkner GE, Pullenayegum EE. Physical activity and other health-risk behaviors during the transition into early adulthood: a longitudinal cohort study. *Am J Prev Med* 2012;42:14-20. <https://doi.org/10.1016/j.amepre.2011.08.026>
- [46] Suryadinata RV, Wirjatmadi B, Adriani M, Lorensia A. Effect of age and weight on physical activity. *J Public Health Res* 2020;9:1840. <https://doi.org/10.4081/jphr.2020.1840>
- [47] Suryadinata RV, Lorensia A, Tangkilisan EC. Effect of physical activity and vitamin D status on geriatrics obesity. *Global Medical & Health Communication* 2019;7:1.6.
- [48] McArthur D, Dumas A, Woodend K, Beach S, Stacey D. Factors influencing adherence to regular exercise in middle-aged women: a qualitative study to inform clinical practice. *BMC Womens Health* 2014;14:49. <https://doi.org/10.1186/1472-6874-14-49>
- [49] Ndahimana D, Kim EK. Measurement methods for physical activity and energy expenditure: a review. *Clin Nutr Res* 2017;6:68-80. <https://doi.org/10.7762/cnr.2017.6.2.68>

Received on August 8, 2020. Accepted on January 4, 2021.

Correspondence: Amelia Lorensia, Fakultas Farmasi Universitas Surabaya (UBAYA), Jl. Raya Kalirungkut Surabaya 60293, Indonesia - E-mail: amelia.lorensia@gmail.com - amelia.lorensia@staff.ubaya.ac.id

How to cite this article: Lorensia A, Muntu CM, Suryadinata RV, Septiani R. Effect of lung function disorders and physical activity on smoking and non-smoking students. *J Prev Med Hyg* 2021;62:E89-E96. <https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1763>

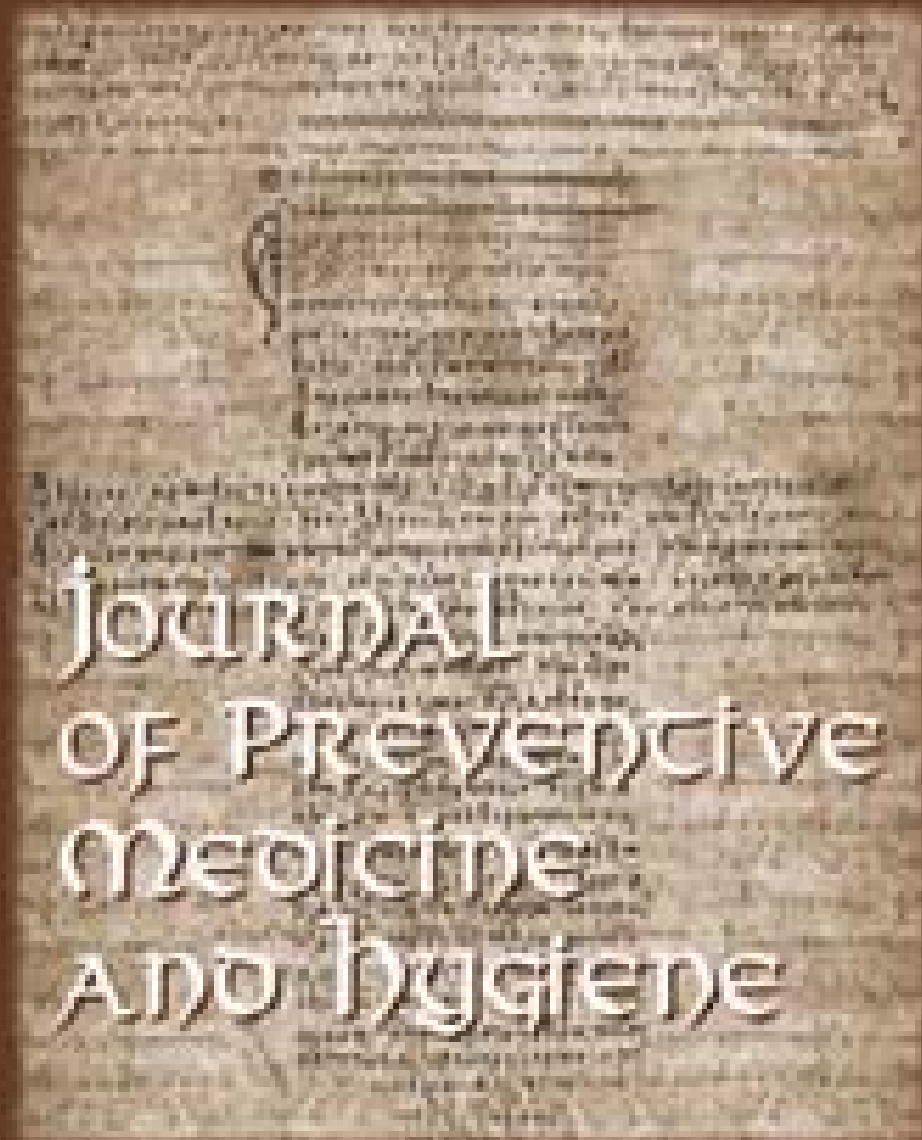
© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

vol. n.
62/1

ISSN 1120-8593 (print)
ISSN 1120-8585 (online)

March
2021



JOURNAL OF PREVENTIVE MEDICINE AND HYGIENE

THE ITALIAN SOCIETY OF PREVENTIVE MEDICINE



SIP

THE ITALIAN SOCIETY OF PREVENTIVE MEDICINE
IS AN OFFICIAL SOCIETY OF THE
MINISTRY OF HEALTH AND
OPERATES UNDER THE
AUSPICES OF THE ITALIAN
MINISTRY OF HEALTH



Editorial Team

Editors

Prof. Roberto Gasparini, University of Genoa, Italy

Prof. Giancarlo Icardi, Department of Health Sciences and Interuniversity Research Centre on Influenza and other infections, Italy

International Editorial Board

Prof. Àngela Dominguez, Departament de Salut Pública Facultat de Medicina, Barcelona.

Prof. Fiona Timmins, School of Nursing and Midwifery, Trinity College, Dublin, Ireland

Prof. Vana Papaevangelou, Prof Pediatric infectious Diseases Third Department of Pediatrics General University Hospital Attikon

Prof. Pierre Van Damme, Professor, Faculty of Medicine and Health Sciences Centre for the Evaluation of Vaccination Vaccine & Infectious Disease Institute, University of Antwerp - Belgium

Prof. Roy Anderson, Professor Sir Roy Anderson FRS FMedSci Director London Centre for Neglected Tropical Disease Research, Department of Infectious Disease Epidemiology, School of Public Health Faculty of Medicine, United Kingdom

Prof. Mario Ramirez, Associate Professor Instituto de Microbiologia Faculdade de Medicina, Universidade de Lisboa

Prof. Gabriele Pelissero, Department of Preventive, Occupational and Community Medicine, University of Pavia, Italy.

Prof. Alberto Izzotti, Department of Health Sciences, University of Genoa, Italy

Prof. Paolo Durando, Department of Health Sciences, Postgraduate School in Occupational Medicine, University of Genoa and Occupational Medicine Unit, IRCCS Polyclinic Hospital San Martino, Italy

Prof. Laura Sticchi, Department of Health Sciences, University of Genoa, Italy

Prof. Maria Luisa Cristina, Department of Health Sciences, University of Genoa, Italy

Dr Daniela Amicizia, Department of Health Sciences, University of Genoa, Italy

Prof. Filippo Ansaldi, Department of Health Sciences, University of Genoa, Italy

Prof. Donatella Panatto, Department of Health Sciences and Interuniversity Research Centre on Influenza and other infections, Italy

Prof. Nicola Nante, University of Siena, Italy

Prof. Rosa Cristina Coppola, Department of Public Health

Prof. Paolo Bonanni, Department of Public Health, University of Florence

Prof. Giovanni Gabutti, Department of Medical Sciences, University of Ferrara

Prof. Silvio De Flora, Department of Health Sciences, University of Genoa, Italy

Prof. Paolo Orlando, Department of Health Sciences, University of Genoa, Italy

Prof. Alessandro Remo Zanetti, Department of Biomedical Sciences for Health, University of Milan, Italy

Prof. Italo Francesco Angelillo, Dipartimento di Medicina Sperimentale, Seconda Università degli Studi di Napoli

Prof. Rino Rappuoli

Prof. Emanuele Montomoli, Department of Molecular and Developmental Medicine, University of Siena, Italy

Prof. Mario Alberto Battaglia, Department of Life Sciences, University of Siena, Italy

Prof. Francesco D'Agostini, Department of Health Sciences, University of Genoa, Italy

Prof. Gabriella Aggazzotti, Dipartimento di Medicina Diagnostica, Clinica e di Sanità Pubblica, Università di Modena e Reggio Emilia

Dott.ssa Anna Maria Spagnolo, Department of Health Sciences, University of Genoa, Italy

Editorial Staff

Prof. Donatella Panatto, Department of Health Sciences and Interuniversity Research Centre on Influenza and other infections, Italy

Dr Daniela Amicizia, Department of Health Sciences, University of Genoa, Italy

Dr Piero Luigi Lai, Department of Health Sciences, University of Genoa, Italy and Interuniversity Research Centre on Influenza and Other Infections, Italy

About the Journal

Focus and Scope

The Journal of Preventive Medicine and Hygiene is published on a three-monthly basis and covers the field of epidemiology and community health. The Journal publishes original papers and proceedings of Symposia and/or Conferences which should be submitted in English with the exception of other languages. Papers are accepted on their originality and general interest. Ethical considerations will be taken into account.

Peer Review Process

A submission from an author will be assigned to an appropriate Associate Editor for selection of Reviewers. Two Reviewers will offer comments and suggestions to the author, which must be addressed to the satisfaction of the Associate Editor. This process may be repeated at the request of the Reviewer or Associate Editor. After acceptance, the contribution will be copy-edited and sent back to the Author for final proofreading. The Editor-in-Chief will review the paper and make a final decision for inclusion in the JPMH.

Open Access Policy

This journal provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge.

Journal of Preventive Medicine and Hygiene

JPMH is open access, peer-reviewed journal which considers paper on the epidemiology and prevention of both infectious and degenerative diseases and the understanding of all aspects of public health

Reproduction or Republishing

The download, the reproduction or the republishing of the articles are forbidden.

For download and reproduction permissions please contact:

scampigli@pacinieditore.it

Sponsors

We thank the University of Genoa and the Italian Society of Hygiene Preventive Medicine and Public Health for the support to the Journal Preventive Medicine and Hygiene

Sources of Support

Sources of Support (unconditional grant)

- [Pfizer Vaccines](#)
- [Sanofi Pasteur](#)
- [Visemederi](#)
- [Seqirus](#)
- [MSD Italia](#)
- Emergent Italy S.r.l.

Journal History

The Journal of Preventive Medicine and Hygiene was founded 60 years ago by Professor Luigi Fernando Petrilli, former director of the Institute of Hygiene of University of Genoa (Italy). The title of the journal was Journal of Hygiene and Preventive Medicine and has been published in Italian until 1988. Since 1989 the Journal is published in English and has assumed the title of Journal of Preventive Medicine and Hygiene. On JPMH were published articles of the leading public health experts on health issues, which, in the second half of the twentieth century and the beginning of the 3rd millennium, the Italian society has faced, as infectious diseases (typhoid, polio, tuberculosis, diphtheria, streptococcal infections, influenza, hepatitis, AIDS, etc) hygienic conditions of housing, air pollutants, school health, road accidents, cancer, cardiovascular diseases, etc. In the journal were also published papers on hospitals, vaccines, sea pollution, health care organization and management, etc.

ISSN 2421-4248



Information

[For Readers](#)

[For Authors](#)

[For Librarians](#)

Make a Submission

©2020 - Journal of Preventive Medicine and Hygiene - jpmh@jpmh.org - ISSN 2421-4248

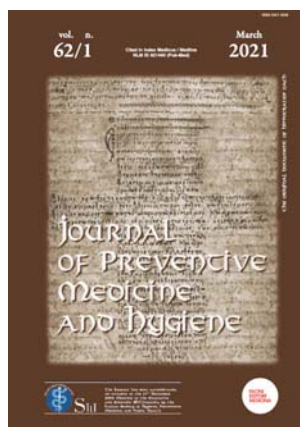




Current Issue

Vol. 62 No. 1 (2021)

Published April 29, 2021



The Journal of Preventive Medicine and Hygiene (JPMH) is an international, multidisciplinary, open-access, peer-reviewed journal published on a three-monthly basis and covers the fields of Hygiene, Preventive Medicine and Public Health. The Journal has been publishing original articles, reviews, editorials, letters and proceedings of symposia and conferences since 1960. Systematic reviews of topics relevant to the journal's aim are highly welcome. Scientific validity, methodological soundness, originality and advances in the field of Hygiene, Preventive Medicine and Public Health are a key acceptance criterion. For further information, please check our Section Policies.

The JPMH is currently abstracted and indexed in PubMed, PubMed Central, Scopus, Web of Science, and Google Scholar. The JPMH currently has no article-processing charges.

[More](#)

Full Issue

PDF

E5

[Healthcare activity as a major risk of dying of Covid-19: medical doctors paid the price.](https://doi.org/10.15167/2421-4248/jpmh2021.62.1.2072)

pdf

E10

[Emergence of COVID-19 in Sicily and the intersection with the 2019-2020 influenza epidemic.](https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1870)

pdf

E54

Sleep duration and its relationship with school performance in Iranian adolescents<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1618>

pdf

E75

Personal hygiene in schools: retrospective survey in the northern part of Côte d'Ivoire<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1655>

pdf

E89

Effect of lung function disorders and physical activity on smoking and non-smoking students<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1763>

pdf

E97

“It’s beyond the pale to smoke hookah”: perceptions of Iranian adolescents on social unacceptability of hookah smoking<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1809>

pdf

E110

Health education intervention to improve vaccination knowledge and attitudes in a cohort of Obstetrics students.<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1811>

pdf

E117

Feasibility and reliability of the Self Administrated Children Lifestyle Assessment (SACLA), a new tool to measure children’s lifestyle behaviors: The VIF Program: reliability questionnaire<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1921>

pdf

E132

Prevalence of consumption of psychoactive substances amongst construction workers<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1238>

pdf

E164

Relationship of pupils' quality of life and academic achievement with the employment status of their mothers<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1624>

pdf

E170

Fungal carriage on healthcare workers' hands, clothing, stethoscopes and electronic devices during routine patient care: a study from a tertiary care center

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1645>

pdf

E174

Worldwide incidence and mortality of ovarian cancer and Human Development Index (HDI): GLOBOCAN sources and methods 2018

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1606>

pdf

E192

Prediction of Multiple sclerosis disease using machine learning classifiers: a comparative study

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1651>

pdf

E249

Immunogenity and antibodies persistance of diphteria-tetanus-acellular pertussis vaccination in adolescent and adults: a sistematic review of the literature showed different response to the available vaccines

<https://doi.org/10.15167/2421-4248/jpmh2020.61.4.1832>

pdf

Infectious Diseases

Alessandro Laghi, Donato Di Nunno, Alessandro Ambrosio, Francesca Romana Baffetti, Nazareno Panichella, Bernardino Marseglia

E1

Living with COVID-19: could SARS-CoV-2 infection present a ping-pong effect?

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1555>

pdf

Ayan Saha

E33

Characteristics, management and outcomes of critically ill COVID-19 patients admitted to ICU in hospitals in Bangladesh: a retrospective study

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1838>

pdf

Health Promotion

Consolato SERGI, Alexander Leung

E46

Vaccination: a question of social responsibility<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1736>

pdf

Ali Delshad Noghabi

E60

The Prevalence of Preventive behaviors and associated factors during early phase of the COVID-19 pandemic among Iranian People: An Application of Health Belief Model: Preventive behaviors during early phase of the COVID-19 pandemic<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1622>

pdf

Mahassen Mohamed Farghaly, Ayman Abdel Hamid Sabah, Khaled Mohamed Keraa

E67

Association between oral health-related quality of life and general health among dental patients: a cross-sectional study<https://doi.org/10.15167/2421-4248/jpmh2020.61.2.1649>

pdf

Fateme khajoei nejad , katayoun Alidousti, parvin salehi nejad , noshirvan khezri moghaddam, Yunes Jahani , parisa divsalar

E82

The influence of mindfulness-based stress reduction [MBSR] on stress, anxiety and depression of unwanted pregnancy: A randomized clinical trial<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1691>

pdf

Environmental Hygiene

Giuditta SCHIAVANO, Veronica Ceppetelli

E48

Assessment of hygienic conditions of recreational facility restrooms: an integrated approach<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1455>

pdf

Jira Kongpran, Chamnong Thanapop, Udomratana Vattanasit

E152

Environmental sanitation and hygiene of elderly workers in Nakhon Si Thammarat Province, Thailand<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1611>

pdf

History of Medicine and Ethics

Guglielmo Mantica, Mariano Martini, Niccolò Riccardi

E3

The possible impact of SARS-COV-2 (COVID-19) on neglected tropical diseases in Europe: the out of spotlights emerging of schistosomiasis.: The possible impact of COVID-19 on neglected tropical

diseases in Europe

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1867>

pdf

Marleide da Mota Gomes

E231

Louis Pasteur and Dom Pedro II engaged in rabies vaccine development

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1631>

pdf

Niccolò Riccardi

E237

Epstein-Barr Virus (EBV) acute acalculous cholecystitis in an immunocompromised adult patient: a case report and a literature review through the history of a neglected clinical presentation.

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1859>

pdf

Hospital Hygiene

Maciej Kielar, Renata dePurbaix, Marzena Agnyziak, Bogumiła Wijaszka, Tomasz Poboży

E25

The Covid 19 pandemic as a factor of compliance with the rules of hand hygiene of hospital staff:: assessment of the usefulness of the “Clean Care is a Safer Care” program as a tool to enhance compliance with hand hygiene principles in hospital conditions.

<https://doi.org/10.15167/2421-4248/jpmh2020.61.4.1603>

pdf

Arvind Kumar, Vishakh C Keri, Maroof Ahmad Khan, Piyush Ranjan, Neha Rastogi, Monalisa Sahu, Naveet Wig

E104

Assessment of healthcare worker’s hand hygiene and infection prevention practices of their personal belongings in a healthcare setting: A survey in pre COVID era and literature review on standard disinfection practices : Infection prevention hygiene practices

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1742>

pdf

Nursing

Sara Dionisi, Marco Di Muzio, Noemi Giannetta, Emanuele Di Simone, Barbara Gallina, Christian Napoli, Giovanni Battista Orsi

E122

Nursing students’ experience of risk assessment, prevention and management: a systematic review

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1698>

pdf

Occupational Medicine and Hygiene

Marcello Fiorini, Antonio La Gioia

E7

COVID 19: Black Swan or clumsy use?<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1829>

pdf

Mesele Bahre Abrha, Akeza Awealom Asgedom, Yisk Arbise Messele, Beyene Meresa Adhena

E141

Days away from work injury and associated factors among waste collectors in Mekelle city, Northern Ethiopia<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1305>

pdf

Pasquale Scopa

E148

Reconstruction of asbestos exposure in cases of workers suffering from pleural neoplasms and employed in sectors not generally associated with high exposure levels: the importance of an accurate standardized assessment of occupational medicine.<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1334>

pdf

Non Communicable Diseases

Divya Karanth, Dr. Veena L Karanth

E200

The Obesity: is it an additional risk factor in analyzing surgical outcomes in the South Indian population? Impact of obesity on surgical outcomes among patients undergoing surgery.<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1696>

pdf

Mitra Darbandi, Yahya Pasdar, Farid Najafi, Shahab Rezaeian, Behrooz Hamzeh, Parisa Niazi

E206

Financial incentive strategy for weight loss and maintenance of weight loss: Financial incentive y for weight loss<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1721>

pdf

Ugonma Dozie, Chikere Ifeanyi Casmir Ebirim, Chidera Rosemary Dike, Ikechukwu Nosike Celestine Dozie, Sally Nkechinyere
Onyeka Ibe, Okwuoma C Abanobi

E213

Determinants of cervical cancer screening uptake among female undergraduates in a tertiary institution in south eastern Nigeria: a cross sectional study.<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1828>

pdf

Salman Khazaei , Somayeh Najafi Ghobadi, Vajihe Ramezani-Doroh

E222

Construction data mining methods in the prediction of death in hemodialysis patients using support vector machine, neural network, logistic regression and decision tree<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1837>

pdf

Health Care Management

Ahmed Gamal, Rana Marwan Al khateeb, Osama M Almugeiren, Nouf H Alsaadoun

E185

The level of fibroblast growth factor-2 prepared from Advanced Platelet Rich Fibrin (A-PRF) in obese Saudi subjects compared to healthy subjects

<https://doi.org/10.15167/2421-4248/jpmh2020.61.1.1632>

pdf

e-Health

Simone Morselli, Arcangelo Sebastianelli, Alexander Domnich, Chiara Bucchi, Pietro Spatafora, Andrea Liaci, Luca Gemma, Stavros Gravas, Donatella Panatto, Sergio Serni, Mauro Gacci

E243

Translation and validation of the Italian version of the user version of the Mobile Application Rating Scale (uMARS) : uMARS questionnaire Italian translation and validation

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1894>

pdf

E13

Clinical features of COVID-19 and SARS epidemics. A literature review

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1680>

pdf

[View All Issues](#)

ISSN 2421-4248




Information

[For Readers](#)

<https://www.jpmh.org/index.php/jpmh/index>

[Make a Submission](#)

[For Authors](#)

[For Librarians](#)

©2020 - Journal of Preventive Medicine and Hygiene - jpmh@jpmh.org - ISSN 2421-4248



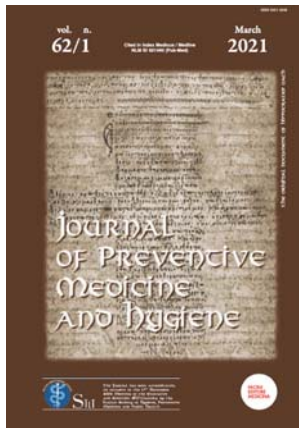
VOL. 62 NO. 1 (2021), ARTICLES

Published April 29, 2021

Effect of lung function disorders and physical activity on smoking and non-smoking students

Amelia Lorensia

Universitas Surabaya



pdf

Keywords

Physical activity, lung function, smokers, non-smokers, spirometry

Abstract

BACKGROUND: The number of young smokers tends to increase, which increases the risk of causing respiratory problems. This is exacerbated by low physical activity which also reduces lung function. The aim was to determine the differences in lung function and levels of physical activity among smokers and non-smokers.

METHOD: This research was conducted in October 2019-January 2020. The research design was cross-sectional, using purposive sampling method. Pulmonary function measurements used spirometry, while physical activity measurements used a modified IPAQ.

RESULT: This study involved 124 subjects, consisting of 62 smokers and 62 non-smokers. smoker group and 62 non-smoker group respondents. There was a significant difference ($p = 0.00$) between smokers (42 of 62) and non-smokers groups (60 of 62). And the results showed no difference ($p = 0.907$) in the level of physical activity between the smokers and non-smokers, although most of the subjects had moderate levels.

CONCLUSION: Student smokers had greater respiratory problems and lower physical activity than non-smokers.

<https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1763>

References

1. Kementerian Kesehatan Republik Indonesia. Penyakit Tidak Menular (PTM) Penyebab Kematian Terbanyak di Indonesia; 2011. [cited 2020 Aust 20]. Available from: <https://www.kemkes.go.id/article/view/1637/penyakit-tidak-menular-ptm-penyebab-kematian-terbanyak-di-indonesia.html>
2. Kementerian Kesehatan RI. INFODATIN: Pusat Data dan Informasi Kmenterian Kesehatan RI; 2018. [cited 2020 Aust 20]. Available from: <https://pusdatin.kemkes.go.id/folder/view/01/structure-publikasi-pusdatin-info-datin.html>
3. Tantisuwat A, Thaveeratitham P. Effects of smoking on chest expansion, lung function, and respiratory muscle strength of youths.

Journal of Physical Therapy Science. 2014;26(2):167-70.

4. -Morgan JC, Byron MJ, Baig SA, Stepanov I, Brewer NT. How people think about the chemicals in cigarette smoke: a systematic review. *J Behav Med.* 2017;40(4):553-64.
5. Durmic T, Lazovic B, Djelic M, Lazic JS, Zikic D, Zugic V, Dekleva M, Mazic S. Influências específicas do esporte nos padrões respiratórios em atletas de elite. *J. Bras. Pneumol.* 2015;41:516-22.
6. Cheung HJ, Cheung, L. Coaching patients during pulmonary function testing: A practical guide. *Canadian Journal of Respiratory Therapy.* 2015;51(3):65-8.
7. Hyndman B, Lecturer S. Move it, Move it: how physical activity at school helps the mind (as well as the body). *The Conversation;* 2018. [cited 2020 Aust 20]. Available from: <https://theconversation.com/move-it-move-it-how-physical-activity-at-school-helps-the-mind-as-well-as-the-body-100175>
8. Liposek S, Planinsec J, Leskosek B, Pajtler A. Physical Activity of University Students and Its Relation To Physical Activity of University Students and Its Relation To Physical Fitness and Academic. *Annales Kinesiologiae.* 2019;9(2):89-104.
9. Jajat, Sultoni K, Suherman A. Barriers to Physical Activity on University Student. *IOP Conf. Ser.: Mater. Sci. Eng.* 2017;180(012210):1-4.
10. Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. *Applied Physiology, Nutrition and Metabolism.* 2010;35(6):725-40.
11. Luzak A, Karrasch S, Thorand B, Nowak D, Holle R, Peters A, Schulz H. Association of physical activity with lung function in lung-healthy German adults: Results from the KORA FF4 study. *BMC Pulmonary Medicine.* 2017;17(1):1-9.
12. Álvarez-Herms J, Julià-Sánchez S, Corbi F, Odriozola-Martínez A, Burtcher M. Putative Role of Respiratory Muscle Training to Improve Endurance Performance in Hypoxia: A Review. *Front Physiol.* 2019;9(1970):1-11.
13. Okrzymowska P, Kurzaj M, Seidel W, Rożek-Piechura K. Eight Weeks of Inspiratory Muscle Training Improves Pulmonary Function in Disabled Swimmers-A Randomized Trial. *Int J Environ Res Public Health.* 2019;16(1747):1-13.
14. Hernández-Álvarez, Edgar Debray, Guzmán-David, Cristian Arvey, Ruiz-González, Juan Carlos, Ortega-Hernández, Ana María, & Ortiz-González, Deisy Carolina. Effect of a respiratory muscle training program on lung function, respiratory muscle strength and resting oxygen consumption in sedentary young people. *Revista de la Facultad de Medicina.* 2018;66(4):605-10.
15. Loponen J, Ilmarinen P, Tuomisto LE, Niemelä O, Tommola M, Nieminen P, Kankaanranta H Daily physical activity and lung function decline in adult-onset asthma: a 12-year follow-up study. *European Clinical Respiratory Journal.* 2018;5(1533753):1-9.
16. Heydari G, Hosseini M, Youseffard M, Asady H, Baikpour M, Barat A. Smoking and Physical Activity in Healthy Adults: A Cross-Sectional Study in Tehran. *Tanaffos.* 2015;14(4):238-45.
17. Kaczynski AT, Manske SR, Mannell RC, Grewal K. Smoking and physical activity: a systematic review. *Am J Health Behav.* 2008;32(1):93-110.
18. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc.* 2003;35(8):1381-95.
19. Perdana S.T. Suyoto, Emy Huriyati, Rina Susilowati and Madarina Julia, 2016. Relative Validity of Administered Indonesian Version of the Short-Form International Physical Activity Questionnaire (IPAQ-SF) among Obese Adolescent Girl Population. *Pakistan Journal of Nutrition,* 15: 816-20.
20. Banur A, Dacosta AL, Wiseman MP, Chaudri S. A Study on Effects of Smoking on Spirometry, Thoracic Gas Volume and Residual Volume In Apparently Asymptomatic Smokers. *IOSR Journal of Fental and Medical Sciences,* 2016;15(12):48-54.
21. Nawafleh HA, Abo Zead SAS, Al-Maghairehc DF. Pulmonary Function Test: The value among smokers and nonsmokers. *Health Science Journal.* 2012;6(4):703-71.
22. GOLD. Global Initiative for Chronic Obstructive Lung Disease; 2019. [cited 2020 Aust 20]. Available from: https://goldcopd.org/wp-content/uploads/2018/11/GOLD-2019-POCKET-GUIDE-FINAL_WMS.pdf
23. WHO. Physical Activity; 2020. [cited 2020 Aust 20]. Available from: https://www.who.int/dietphysicalactivity/factsheet_adults/en/
24. Middleton, R. What Does "Control" Have to Offer?. *IEEE Control Syst.* 2011;31(1):12-13.
25. Saito T, Miyatake N, Sakano N, Oda K, Katayama A, Nishii K, Numata T. Relationship Between Cigarette Smoking and Muscle Strength in Japanese Men. *Journal of Preventive Medicine and Public Health.* 2012;45(6):381-6.
26. Harris JE. Cigarette Smoke Components and Disease: Cigarette Smoke is More Than a Triad of Tar, Nicotine, and Carbon Monoxide. *Health Science Journal.* 8(2):59-75.
27. Thomas ET, Guppy M, Straus SE, Bell KL, Glasziou P. Rate of normal lung function decline in ageing adults: a systematic review of prospective cohort studies. *BMJ Open.* 2019;9(e028150):1-13.
28. Lorensia A, Wahyudi M, Yudiarto A, Kurnia SED. Effect of illness perception on improving asthma symptoms with omega-3 fish oil therapy: Pre-post design. *Journal of Applied Pharmaceutical Science.* 2020;10(6):62-71.
29. Ostrowski S, Barud W. Factors influencing lung function: Are the predicted values for spirometry reliable enough?. *J. Physiol. Pharmacol.* 2006;57(4):263-71.
30. Roman MA, Rossiter HB, Casaburi R. Exercise, Aging and The Lung. *Eur Respir. J.* 2016;48:1471-86.
31. Carey MA, Card JW, Voltz JW, Arbes SJ, Germolec DR, Korach KS, Zeldin DC. et al. It's all about sex: gender, lung development and lung disease. *Trends Endocrinol. Metab.* 2007;18(8):308-13.
32. Lomauro, A., Aliverti, A. Sex differences in respiratory function. *Breathe.* 2018;14(2):131-140.
33. Suryadinata RV, Lorensia A, Sari RK. Differences in Nutrition Food Intake and Body Mass Index between Smoker and Non-smoker in Adult. *Indonesian Journal of Clinical Pharmacy.* 2017;6(3):171-80.
34. Fitria, Triandhini RINKR, Mangimbukude JC, Karwur FF. Merokok dan Oksidasi DNA. *Sains Medika,* 2013;5(2):113-20.
35. Tommola M, Ilmarinen p, Tuomisto LE, Haanpaa J, Kankaanranta T, Niemela O, Kankaanranta H. The effect of smoking on lung function: a clinical study of adult-onset asthma. *Eur Respir J.* 2016;48:1298-304.

36. Taghavi S, Khashyarmaranes Z, Moalemzadeh-Haghighi H, et al. Nicotine content of domestic cigarettes, imported cigarettes and pipe tobacco in iran. *Addict Health*. 2012;4(1-2):28–35.
37. Oelsner EC, Balte PP, Bhatt SP, Cassano PA, Couper D, Folsom AR, Freedman ND, Jacobs DR, Kalhan R, Mathew AR, Kronmal RA, Loehr LR, London SJ, Newman AB, O'Connor GT, Schwartz JE, Smith LJ, White WB, Yende S. Lung function decline in former smokers and low-intensity current smokers: a secondary data analysis of the NHLBI Pooled Cohorts Study. *Lancet Respir. Med*. 2019;8(1):34–44.
38. Bhatt SP, Kim YI, Harrington KF, Hokanson JE, Lutz SM, Cho MH, DeMeo DL, Wells JM, Make BJ, Rennard SI, Washko GR, Foreman MG, Tashkin DP, Wise RA, Dransfield MT, Bailey WC. Smoking duration alone provides stronger risk estimates of chronic obstructive pulmonary disease than pack-years. *Thorax*. 2018;73(5):414–21.
39. Fagaras SP, Radu LE, Vanvu G. (2015). The Level of Physical Activity of University Students. *Procedia - Social and Behavioral Sciences*. 2015;197:1454–7.
40. Kwan MY, Cairney J, Faulkner GE, Pullenayegum EE. Physical activity and other health-risk behaviors during the transition into early adulthood: A longitudinal cohort study. *American Journal of Preventive Medicine*. 2012;42(1):14–20.
41. Suryadinata RV, Wirjatmadi B, Andriani M, Lorensia A. Effect of Age and Weight on Physical Activity. *Journal of Public Health Research*. 2020;9(2):187–90.
42. Suryadinata RV, Lorensia A, Tangkilisan EC. Effect of Physical Activity and Vitamin D Status on Geriatrics Obesity. *Global Medical & Health Communication*. 2019;7(1): 1–6.
43. McArthur D, Dumas A, Woodend K, Beach S, Stacey D. Factors influencing adherence to regular exercise in middle-aged women: A qualitative study to inform clinical practice. *BMC Women's Health*. 2014;14(49):1–8.
44. Ndahimana D, Kim E, Kim E. Measurement Methods for Physical Activity and Energy Expenditure: a Review. *Clinical Nutrition Research*. 2017;6(2):68–80.

ISSN 2421-4248



Information

[For Readers](#)

[For Authors](#)

[For Librarians](#)

Make a Submission

©2020 - Journal of Preventive Medicine and Hygiene - jpmh@jpmh.org - ISSN 2421-4248

