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Addressing Tobacco Problems In Developing Countries

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SMOKING HABITS AND PULMONARY PHYSIOLOGY

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The prevalence of smoking in Indonesia is worrying. In fact, smoking increases the risk of cancer, cardiovascular and respiratory disorders. The content of cigarette smoke that are toxic carcinogenic is irritating to the respiratory mucosal epithelium and affect the smooth muscle of the airway wall.

The purpose of this study was to determine the relationship of active and passive smoking behavior with the incidence of lung function abnormality (FEV1 <80%). Observational analytic cross-sectional study is conducted in Bantul Yogyakarta with 84 volunteers who are willing to sign the sheet capability. The function of lung is observed with the FEV1 parameters set by the spirometer. Structured interviews are guided by a questionnaire carried out by trained personnel to explore the active and/or passive smoking habits of respondents, presence or absence of obstructive pulmonary disease, type of work and education history. Respondents who are willing to participate in the study but have shown a history of obstructive lung disease are excluded as volunteers. The data are presented descriptively followed by bi variant analysis. Chi squar test is used to determine the relationship of passive or active smoking habits and pulmonary physiological functions (normal FEV1 (80% or more) or normal (<80%)) with a confidence level of 95%.

The results show that 44% of respondents are male and 56% female with 70% aged 50 years or more. Most respondents (58%) are high school educated or academic. The occupations of the respondents are mostly in private sector, laborers, farmers or unemployed (87%), only 13% is in public service or military service. As many as 33% respondents are passive smokers as well as active smokers. The majority (64%) of respondents has normal lung function (FEV1> 80%), 36% has abnormal lung function. From the chi square test between passive or active smoking habits with lung function, it is known that passive smoking and active smoking habits has an association with the incidence of lung function abnormality (FEV1 <80%). Incidence of lung function abnormalities 10x in active smokers is than non-smokers active (OR = 10; CI: 1.9 - 17; p <0.05). Incidence of lung function abnormalities 7x in smokers than non-passive passive smoking (OR = 7.8 CI: 1.5 - 13; p <0.05).

Conclusion: Passive and Active Smoking increases the prevalence of lung physiology abnormality.

Keywords: passive or active smoking habits; lung physiology abnormality; FEV1; cross sectional.

Full Paper

SMOKING HABITS AND PULMONARY PHYSIOLOGY

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The purpose of this study isto determine the relationship between active andpassive smoking behavior andthe incidence of lung function abnormality (FEV180%).Observation and cross-sectional study was conducted in Bantul Yogyakarta to84volunteers who are willing to participate the researchand sign the inform consent. The function of the lungwasobserved usingthe FEV1 parameters set by the spirometer. Structured interviews guidedby a questionnaire carried out by trained personnels to explore the active and/or passive smokinghabits of the respondents based on the presence or absence of obstructive pulmonary disease, type of work andeducation history. Respondents who werewilling to participate in the study but showedthehistory of obstructive lung disease wereexcluded as the volunteers. The data were presenteddescriptively followed by bivariate analysis. Chi square test wasused to determine the relationshipbetween passive or active smoking habits and pulmonary physiological functions (normal FEV1 80%or more) or normal (<80%)) with the confidence level of 95%.

The results showsthat 44% of respondents aremale and 56% female with 70% aged50 years or more. Most respondents (58%) graduate fromhigh school or academy. The respondents'jobs are mostlyprivate employee, laborers, farmers or unemployment(87%).Only 13% of them arecivilservant or military-police. As many as 33% of respondents arepassive smokers as well as activesmokers. The majority (64%) of respondents havenormal lung function (FEV1> 80%), and 36% haveabnormal lung function. From the chi square test between passive or active smoking habits withlung function, it is known that passive smoking and active smoking habits correlateswith theincidence of the lung function abnormality (FEV1 <80%). Incidence of lung function abnormalities10x in active smokers is than non-smokers active (OR = 10; CI: 1.9 - 17; p <0.05).The incidence of thelung function abnormalities is 7x in smokers than non-passive passive smoking (OR = 7.8 CI: 1.5 -13; p <0.05). Conclusion: passive and active Smoking increases the prevalence of lung physiologyabnormality.

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INTRODUCTION

The cigarette consumption is increasing around the world nowadays. This condition especially happens in the country with the low income. World Health Organization (WHO) states that eighty percent (84%) smokers from around the world comes from developing countries. This condition leads to the increasing numbers of the diseases related to the cigarette consumption in the developing countries (WHO, 2006).

Smoking habits can increase the risk to get cancer, cardiovascular, and respiratory disease. Smoking also becomes the primary cause of chronic diseases and death in the developing countries as well as the second cause of death in the world (Ezzati et al., 2002).

According to Savitz et al., (2006), the cigarettes main elements is Polycyclicaromatic hydrocarbon, carbon monoxide, nicotine, as well as the mix of N-nitroso, polonium, radon, arsenic, and cadmium. Those elements can increase the risk of cancer, cardiovascular, diseases in the mouth, disorders in reproduction, and chronic obstructive pulmonary disease (COPd).

Based on the research results, smoking can increase the risk to get chronic bronchitis and a variety of respiratory disease (Isabel et al., 2005). The increasing number of the sufferers is in line with the increasing cigarette consumption each day. The number of the daily cigarette consumption has a direct relationship with the decreasing value of the Forced Expiratory Volume in the first second (FEV 1)and the FEV 1 ratio compared to the capacity of the Forced Vitas Capacity (FVC). Mangunegoro (2001)also states that there is a relationship between the decreasing of FEV 1 and the quantity, type, and length of smoking.

WHO predicts that more than 700 million children, or nearly half of the children all over the world, heal the air that polluted by the cigarette smoke. Most of the children heal the cigarette-polluted air in the house. Those children are susceptible to get asthma, pneumonia, bronchitis, ear infection, cough, wheezing, and increased mucus production. Most of the children heal the cigarette-polluted air at home.

Based on the aforementioned background, the research on the correlation between smoking habits in the family and the FEV 1 lung's function is significant. How the correlation between active and passive smoking and the FEV 1 lung's function becomes the problem formulation while the aims of this research is to know the correlation between active and passive smoking behavior and the FEV 1 lung's function.

RESEARCH METHODOLOGY

The method of this research used cross sectional observational study. The research was conducted in the working area of Puskesmas 1 (Community Health Center)Bantul and the population was the community lived in the working area of Puskesmas 1 Bantul. The sample was determined using the formulation based on the minimum number of the samples to estimate the population of the two groups (Lemeshow et al., 1997). The desired sample was estimated to fall within the range of 15% lower and upper the real proportion with the 95% trust added for the anticipation to the errors and failure in the research process. The number of samples was added by 10% of the minimum sample. Therefore, the number of the samples needed was 42 persons. The inclusion criteria for this research are:

    a. Javanesse community living in the working area of Puskesmas 1 Bantul.

    b. The Respondents are willing to participate in the research.

Meanwhile, the exclusive criterion is the patients who have lung diseases, such as: Chronicobstructive pulmonary disease, bronchiectasis, pneumonia, pulmonarytuberculosis, and lung tumor.

Research Variable
1. Dependent variable   : active/passive smokers
2. Independent Variable   : pulmonary funcion (FEV 1)

Operational Definition

1. Active Smokers

    Active smokers are the persons who smoke cigarettes that use or are without filter directly (Bustan, 1997). In this research, someone is called as a smoker when he/she smoke at least 3 cigarettes each week or 12 cigarettes each month.

2. Passive smokers

    Passive smokers are the persons who heal the cigarette smoke or the like from the active smokers around, but they do not smoke the cigarettes that use or are without filter directly (Bustan, 1997). In this research, someone is called passive smokers when he/she becomes passive smokers at least 6 hours each week or 24 hours each month.

3. Pulmonary Function

    The lung' ability to breathe is the definition of pulmonary function. In this research, the pulmonary function is described from the volume and capacity of the respiration. The volume and capacity can be used as the indicator whether there is abnormality in the lung's function (Alsagaff, 2005).

4. FEV1

    FEV 1 is the forced expiratory volume in one second. The common value for FEV 1 is around 80%, meaning that in the normal condition 80% of the air can be forced to be released from the lung that have maximum expand during the first 1 second (Guyton, 1997).

5. BMI (Body Mass Index)

    BMI is the ratio of your weight in the high box (weight/height). The number is proportional with your body shape. It is common that the small number is for the slim person and the big number is for the heavy ones (Guyton, 1997).

RESEARCH INSTRUMENT

This research used questionnaire as the instrument and spirometry to test the pulmonary function.

Data Processing and Analysis

The researcher edited and coded the data obtained from the questionaire to be statistically analyzed using univariate, bivariate, and multivarite analysis. The univariate analysis is to know the research subject characteristics that includes age, gender, BMI, marital status, education, as well as smoking data. The data also includes the description of the pulmonary function by counting the frequency distribution and its proportion. Those data were analyzed based on the corrrelation of each variable with the pulmonary function. The multivariate analysis is to know the correlation among the variables that includes smoking relationship, age, gender, BMI, occupation and distance conversion with the pulmonary function using the regression test.

Reserach Ethics

The research subjects were the respondents who smoke/passive smokers. The research ethics became the primary concern. The researcher explained to the subject about the aims and objectives of the research. She also explained about the research that was conducted in the form

of observation. Before conducting the research, the researcher must have the permission from the related institution and the research subjects. The permission was in the form of filling and signing the form (informed consent).

RESULT AND DISCUSSION

1. Respondent Illustration

This research took 84 respondents to be involved that consisted of 42 respondents of the passive and active smokers as the cases and 42 respondents who do not smoke as the control. The general description of the respondents can be seen in table 1 and 2.

From table 1, it is figured out that 44% respondent (37 persons) are male and 56% respondent (47 persons) is female. Based on the age, the respondents whose age are <20 years old is 6%, 21-30 years old (22.6%), 31-40 years old (20.2%), 41-50 years old (22.6%), 51-60 years old (19%) and the respondent group aged >60 years old is 9.5%.

Based on the education background, the respondents who graduate from the elementary school are 21.4%, Junior High School (20.2%), Senior High School (38.1%) and scholar (20.2%). Based on the occupation, the respondents who do not work are 27.4%, civil servant (9.5%), private employee (36.9%), TNI/POLRI (military) (3.65) and students (2.4%). Meanwhile, based on the BMI, most of the respondents have BMI between 17-25, about 85%, BMI between 20-30 (9.5%) and BMI < 17 (4.8%).

Table 1. Responent Charateristics based on the Gender, Age, and Education at Kweden Village. Bantul.

No	Subject Characeristics	FEV1 Abnormal	Normal	Total
1	Gender			
	MALE	6	31	37
		20%	57.40%	44%
	FEMALE	24	23	47
		80%	42.60%	56%
	Total	30	54	84
		100%	100%	100%
2	Age			
	<20	2	3	5
		6.70%	5.60%	6%
	21-30	2	17	19
		6.70%	31.50%	23%
	31-40	6	11	17.00
		20%	20.40%	20.20%
	41-50	8	11	19
		26.70%	20.40%	22.60%
	51-60	5	11	16
		16.70%	20.40%	19%
	>60	7	1	8
		23.30%	1.90%	9.50%

No	Subject Characeristics	FEV1 Abnormal	Normal	Total
	Total	30	54	84
		100%	100%	100%
3	Education			
	Elementary School	10	8	18
		33.30%	14.80%	21.40%
	Junior High School	10	7	17
		33.30%	13.00%	20%
	Senior High School	10	22	32
		33.30%	40.70%	38.10%
	Scholar	0	17	17
		0%	31.50%	20.20%
	Total	30	54	84
		100%	100%	100%

Table 2. Respondent Characteristics based on the Occupation and BMI at Kweden Village, Bantul.

No	Subject Characteristics	FEV1 Abnormal	Normal	Total
1	Occupation			
	unemployment	6	17	23
		20%	31.50%	27.40%
	Civil Servant	2	6	8
		6.70%	11.10%	9.50%
	Private Employee	11	20	31
		36.70%	37%	36.90%
	Military	1	2	3
		3.30%	3.70%	3.60%
	Students	1	1	2
		3.30%	1.90%	2.40%
	Others	9	8	17
		30%	14.80%	20.20%
	Total	30	54	84
		10%	100%	100%
2	BMI			
	<17	1	3	4
		3.30%	5.60%	4.80%
	17-25	26	46	72
		86.70%	85.20%	85.70%
	26-30	3	5	8
		10%	9.3%	9.50%
	Total	30	54	84
		100%	100%	100%

2. Bivariate Analysis

In this research, the variable that was assumed to have correlation with the pulmonary function FEV 1 was also observed. The variable that was analyzed as the risk factor that decreased the pulmonary function FEV 1 was to become active or passive smokers. The calculation result and bivariate risk factor analysis was shown in table 3, 4, and 5.

Based on the bivariate analysis, it is figured out that risk factor variable that correlates with the normal function of the lung FEV1 and statistically have significant meaning is the active smokers (RR=0.052; $p<0.05$) and passive smokers (RR=0.271; $p>0.05$).

Table 3. BivariateAnalysis Result of the Control Group and Passive Smokers
at Kweden Village, Bantul

Risk Factor		Control	Passive	Total	RR	CI	P
FEV1 Normal Value	No	6	8	14			
		14.3%	31.1%	22.2%	0.271	0.079-0.930	0.032
	Yes	36	13	49			
		85.7%	61.9%	77.8%			
	total	42	21	63			
		66.7%	33.3%	100%			

From the table above, it is shown that there is significant correlation between passive smokers and the normal function of the lung (FEV 1) (RR=0.271; $p<0.05$).

Table 4. Bivariate Analysis Result of the Control Group and Active Smokers
at Kweden Village, Bantul

Risk Factor		Control	Active	Total	RR	CI	P
FEV1 Normal Value	No	6	16	22			
		14.3%	76.2%	20.3%	0.052	0.014-0.196	0.000
	Yes	36	5	41			
		85.7%	23.8%	79.7%			
	total	42	21	63			
		66.7%	33.3%	100%			

From the table above, it is shown that there is significant correlation statistically between the active smokers and the normal function of the lung (FEV1) (RR=0.052; $p<0.05$). The opportunity of active smokers to have normal FEV 1 is 0.052 rather than non smokers.

Table 5. Bivariate Analysis Result of the Passive Smoker Group and Active Smokers at Kweden Village, Bantul

Risk Factor	Passive	Active	Total	RR	CI	P
FEV1 ValueNo	8	16	24			
Normal	31.1%	76.2%	57.1%	0.192	0.051-0.731	0.013
Yes	13	5	18			
	61.9%	23.8%	42.9%			
total	21	21	42			
	50%	50%	100%			

From the table above, it is shown that there is significant correlation between active smokers and passive smokers (RR=0.192; p<0.05).

3. Multivariate Analysis

Table 6. Multivariate Analysis Result on the Factors that Correlate with the Pulmonary Function at Kweden Village, Bantul.

No	Risk Factor	RR	CI	P
1	Smokers	2.840	1.376-5.862	0.05
2	Gender	0.220	0.48-1014	0.052
3	Age	0.951	0.608-1.500	0.829
4	Education	2.231	0.603-21.844	0.016
5	Occupation	1.109	1.158-4.296	0.600
6	BMI	1.548	0.335-7.158	0.576

From the table above, it is shown that there are some risk factors that correlates with the decrease of the pulmonary function FEV 1. After the multivariate analysis, there are risk factors and the result is significant based on the statistic analysis. There is significant correlation between smoking and education degree. The result is (RR=2.840; CI=1.376-5.862; p<0.05) and (RR=2.231; CI=1.158-4.296; p<0.05).

4. The Correlation of Smoking Habits toward Pulmonary Function.
a. The Correlation of Daily Smoking Habits toward the Pulmonary Function.

Among 21 respondents, there are 12 (57.2%) respondents who smoke everyday and 9 (42.8%) respondents who do not smoke everyday. From the calculation in table 7, it is figured out that there is correlation between daily smoking habits and the value of pulmonary function, but the correlation is not significant statistically (RR= 1.167; CI= 0.151-9.006; p>0.05).

Table7. The Illustration of the Correlation between Smoking Frequency
and the Pulmonary Function at Kweden village, Bantul year 2010

Length of Smoking		Abnormal	Normal	Total	RR	CI	p
Smoking Everyday	No	7	2	9			
		33.3%	9.52%	42.8%	1.167	0.151-9.006	0.88
	Yes	9	3	12			
		42.8%	14.2%	57.2%			

b. The Correlation between Smoking more than 10 years and the Pulmonary Function. Among 21 respondents, there are 8 (31.8%) respondents who smoke more than 10 years and there are 13 (61.9%) respondents who smoke less than 10 years. From the calculation in table 8, it is figured out that there is correlation between smoking habits for more than 10 years and the pulmonary function (RR= 1.625; CI= 1.051-2.497; p<0.05).

Table 8. The Illustration of the Correlation between the Length of Smoking
and the Pulmonary Function at Kweden Village, Bantul year 2010

Length of Smoking		Abnormal	Normal	Total	RR	CI	P
Smoking >10 years	No	8	0	8			
		38.1%	0%	38.1%	1.625	1.057-2.497	0.04
	Yes	8	5	13			
		38.1%	23.8%	61.9%			

c. The Correlation between smoking for more than 10 cigarettes each day and the pulmonary function

Among 21 respondents, there are 8 (38.1%) respondents who smoke more than 10 cigarettes each day and there are 13 (61.9%) respondents who smoke less than 10 cigarettes each day. From the calculation in table 9, it is figured out that there is correlation between smoking habits more than 10 cigarettes each day and the pulmonary function, but the correlation is not significant(RR= 0.9; CI= 0.115-7.031; p>0.05).

Table 9. The Illustration of the Correlation of the Number of Cigarettes Smoked
and Pulmonary Function at Kweden Village, Bantul year 2010

The length of smoking		Abnormal	Normal	Total	RR	CI	p
cigarettes >10 cigarettes	No	6	2	8			
		28.5%	9.5%	38.1%	0.9	0.115-7.031	0.90
	Yes	10	3	13			
		47.6%	14.3%	61.9%			

DISCUSSION

The FEV 1 pulmonary function can be influenced by age, gender, education, occupation, BMI (Body Mass Index), smoking status, physical exercises, air pollution, or respiratory diseases. However, in this epidemiology research, the one used as the factor to discriminate is the smokers' status, as the active or passive smokers, or non-smokers. Because this research is the epidemiology research conducted at Kweden Village, Sewon Sub-District, of Bantul District, Yogyakarta Special Region, The researcher does not emphasize on other variables that may influence FEV 1 pulmonary even though those variables are still well observed.

a. The Correlation between Smoking Status and FEV 1 Pulmonary Function

From the measurement of the pulmonary function on the control subject, out of 42 respondents, there were 36 respondents who had normal FEV 1 pulmonary function and 6 respondents with abnormal FEV 1 pulmonary function. Meanwhile, the observation result upon subjects who were passive smokers, out of 21 respondents, 8 respondents had abnormal FEV 1 pulmonary function and the other 13 had normal FEV 1 pulmonary function. Among the active smokers, out of 21 respondents, there were 16 respondents who had abnormal FEV 1 abnormal FEV 1 pulmonary function and only 5 who had normal FEV 1 pulmonary function.

The statistical analysis shows that there are significant differences on theFEV 1 pulmonary function between the control active smokers and active and passive smokers.

This research proves that active have worse FEV 1 pulmonary function than passive smokers or the groups who do not smoke. This condition appears because the smokers heal more smoke than the passive ones.

Everybody knows that cigarettes have a lot of dangerous substances for the body. The smoke also contains dangerous chemical substance that can harm human respiratory system. The immune system in the form of cilia along the respiratory channel will be damaged when it is always exposed to the smoke. Then, there will be inflammation in the respiratory channels which narrow the respiratory channel such as bronchus and bronchioles.

At the alveoli level, the smoke can cause the onset of fleck that may lessen the alveolus elasticity and becomes stiff, and then disrupt the process of normal respiratory. Those factors mentioned before are causes of to the decrease of the pulmonary function when they are measured by spyrometer.

The researcher uses the spyrometer to measure the FEV 1 scale. The instrument measures the air that can be exhaled in one second after a deep breath. The air volume is measured in liter. The reduced air exhales from the body is caused by the smoke.

The smoke exposed to the respiratory organ can be differentiated based on its intensity according the smokers' status. Active smokers heal and are exposed more smoke than the passive ones as well as group who is not exposed to the smoke. On the other hand, passive smokers are less exposed to the smoke than the active ones but get higher smoke than the control group. Why the result shows significant differences.

Another research that measure the correlation between smoking habits and the pulmonary capacity done by Hanida (2007) shows that there is significant correlation between smoking habits and the vital pulmonary capacity ($p = 0.002$).

CONCLUSION AND RECOMMENDATION

After the research on the correlation between passive and active smoking habits toward the pulmonary function (FEV 1) at the working area of Puskesmas 1 (Community Health Center), Bantul, the results are as follow:

1. There is a correlation between active and passive smokers toward the pulmonary function at working area of Puskesmas 1 Bantul.
2. There is different FEV 1 pulmonary function between active and passive smokers at the working area of Pusesmas 1 Bantul.

SUGGESTIONS

Based on the conclusion aforementioned before, there are some suggestions:

1. To conduct the life in the healthy life style or stop smoking should be done in the early step to prevent the diseases.
2. Smoking habits should be controlled to lower the risk the pulmonary function decrease.
3. The effort to educate the society related to the hypertension-factor should be done continuously not only by the government but also related institution to lessen the smoking habits as one of the disease causes that leads to death.
4. This research can be used as the reference to conduct the follow up research that is more specific with more population to scrutinize more the correlation between smoking and various harmful diseases affected the health.

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