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ORIGINAL ARTICLE

Evaluation of Pulmonary Function Tests Results of Non-smoker Women Whose Husbands Smoke

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ABSTRACT

Aim: In this study, we aimed to investigate the effect of passive smoking on pulmonary function test results by comparing pulmonary function tests of women whose husbands were smokers versus non-smokers.

Methods: A total of 179 volunteer married women aged 18-64 years, who applied to Istanbul Şişli Hamidiye Etfal Training and Research Hospital Family Medicine Outpatient Clinics between March 2019 and June 2019, participated in the study. A questionnaire and pulmonary function test were applied to the participants for whom the socio-demographic characteristics and smoking behavior of their spouses were evaluated.

Results: Participants were divided into two groups, 90 women whose husbands smoked and 89 who did not smoke, and their data were compared. The mean age of the participants was 37.8± 9.8 years. 109 (60.9%) of whom were primary and secondary school graduates, and 139 (77%) of whom were housewives. 107 (59.8%) of the participants did not have any complaints; among those with complaints, cough was the most common for smokers (22.2%; n=20), and dyspnea (16.9%; n=15) was the most common for non-smokers. While there was no significant difference between the two groups in terms of shortness of breath and sputum production, cough complaint was found to be statistically significantly higher in the group whose husbands were smokers (p=0.028). Although there was no statistically significant difference between the groups in terms of VC (lt), VC (% expected), FVC (% expected), FEV1 (lt), FEV1(% expected) and FEV1/FVC (%) (p>0.05), mean FVC (lt) of the patients in the smoking group was significantly lower than in the non-smoking group (p=0.030). In addition, as the number of cigarettes smoked daily by the spouse increased, a significant decrease was found in VC (lt), VC (% expected), FVC (lt) and FEV1.

Conclusions: As a result of this study, coughing complaints were more common in the women whose husbands were smoker. Cough is an important symptom indicating moderate respiratory dysfunction. In the case of a prolonged cough in cases where the husband smokes, it may be recommended that the patient be evaluated with respiratory function tests.

Keywords: Cough, dyspnea, passive smoking, pulmonary function test, smoking

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Introduction

For the last 50 years, the harmful effects of tobacco products on human health have been known (1). In the last 30 years, the information that smoking increases the risk of a wide range of diseases ranging from cancer, cardiovascular disease to stroke, and of death, has been increasing. Smoking is the cause of nearly 20 fatal diseases and more than 50 health problems (2).

As of 2016, around 18.5 million people in Turkey use tobacco products. Considering that this number was 14.8 million in 2012, it is seen that the use of tobacco has increased over time (3).

Passive smoking is defined as breathing a mixture of smoke from the combustion of tobacco products and smoke blown out by the smoker (4). In addition to active smoking, exposure to indoor cigarette smoke against one's own will has been shown to be as effective as active smoking in the formation of smoking-related diseases. It is known that deterioration in respiratory functions, which is known to be faster and more common in active smokers, is similar in people who are passive smokers (5).

Spirometry is the basic pulmonary function test (PFT) used to evaluate pulmonary functions. It is based on measuring the flow or volume changes that occur with breathing as a function of time (6). There are some parameters that affect respiratory functions. These are age, gender, body size (height, weight) and race. While there is an increase in respiratory functions, especially FVC and FEV1, until the age of 20, there is a decrease in FEV1 every year after the age of 30. This loss is much faster in people who smoke. Men's respiratory functions are higher than women of the same age and height (7).

In our study, we aimed to investigate the effect of passive smoking on PFT by comparing pulmonary function tests of women whose spouses smoked versus non-smokers.

Methods

The study was approved by the Hospital's Ethics Committee (Approval Date: 05.03.2019, approval code: 2293).

This study was a single-center, prospective and cross-sectional. Non-smoker married women aged 18-64 who applied to the Hospital Family Medicine outpatient clinics between 10/03/2019-10/06/2019 were included in the study. Female individuals over the age of 18 and under the age of 65 who did not smoke, had no communication barriers, and agreed to participate in the study were included. Exclusion criteria were: under 18 or over 65, communication disability, acute or chronic lung disease, working in the workplace that may cause occupational lung disease, smoking or smoking in the workplace, individuals who did not accept to participate or had conditions that would affect PFT, such as pregnancy, and living at a high altitude.

250 participants from among non-smoker married women aged 18-64 were examined and 71 of them were excluded because they did not meet the inclusion criteria or could not comply with the pulmonary function test. The sample size of the study was 179 people in total and two groups were formed according to the smoking status of their husbands: 90 participants whose husbands smoked (Group-1) and 89 participants whose husbands did not smoke (Group-2). The collected data was compared. The flow chart of the study is given in Figure 1.

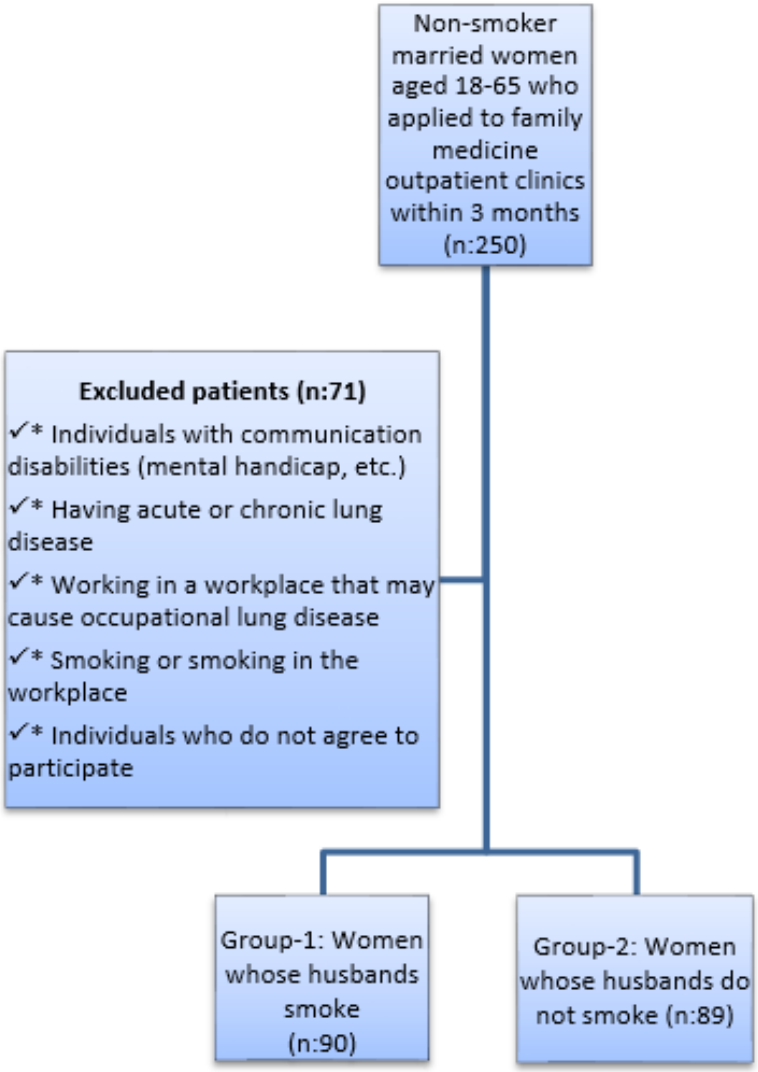

Figure1. Flow chart for the participation

Pulmonary Function Test: the daily calibrated Chest brand HI-101 model spirometry device was applied a minimum of 3 times and a maximum of 8 times while the patients were sitting, and the optimal results were recorded.

Descriptive statistics were reported as numbers and percentages for categorical variables; mean, standard deviation, minimum and maximum for numerical variables. Conformity of continuous variables to normal distribution was examined using the Shapiro-Wilk test. Comparisons of numerical variables between two independent groups; Student -t-Test was compared with normal distribution condition and Mann-Whitney U test when normal distribution condition was not met. The Chi-Square test tested the differences between the ratios of categorical variables between groups. The relationship between continuous variables was analyzed by correlation analysis, and the Spearman correlation coefficient was calculated. SPSS (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.) was used for statistical analysis. The type I error rate was accepted as $p<0.05$.

Results

Among 250 people, 179 people who met the inclusion criteria were included in our study, and their mean age was 37.8 ± 9.8 (19-65). 109 (60.9%) of the participants were primary and secondary school graduates and 139 (77%) were housewives. The average monthly income of 126 (70.4%) of the participants was between 1600-3200 ₺. Participants were divided into 2 groups according to their spouse's smoking status and evaluated comparatively. 90 of them were smokers; 89 of them were non-smokers. There was no significant relationship was found between the groups (p>0.05).

Table1. Comparison of the sociodemographic data of the participants according to the groups

	All (n:179)	Husband smoker (n:90)	Husband non-smoker (n:89)	p- value
Age (Median, minimum-maximum)	37 (19:65)	35(21:65)	38(19:62)	0.770
Body mass index (Median, minimum-maximum)	25(16:42)	25.87(16:42)	25.61(18;42)	0.290
Educational status n(%) Illiterate Below high school High school and above	 17(9.5) 109(60.9) 53(29.6)	 12(13.3) 52(57.7) 26(28.8)	 5(5.6) 57(64) 27(30,3)	 0.210
Family monthly total income n(%) <1600 ₺ 1600-3200 ₺ >3200 ₺	 20(11.2) 126(70.4) 33(18.4)	 12(13.3) 62(68.9) 16(17.8)	 8(9) 64(71.9) 17(19.1)	 0.650
Occupation n(%) Housewife Worker	 139(77.7) 40(22.3)	 75(83.3) 15(16.7)	 64(71.9) 25(28.1)	 0.070

Participants were asked whether they had cough, shortness of breath or sputum complaints (Table2). The majority (59.8%; n=107) stated that they did not have any complaints. Cough complaint was statistically significantly higher in the group whose spouses smoked compared to the group whose spouse did not smoke (p=0.028).

Table2. Analysis of the respiratory complaints of the participants

	All (n:179)	Husband smoker (n:90)	Husband non-smoker (n:89)	p-value
Respiratory complaint n(%)				
Yes	72(40.2)	38(42.2)	34(38.2)	0.583
No	107(59.8)	52(57.8)	55(61.8)	
Cough n(%)				
Yes	29(16.2)	20(22.2)	9(10.1)	0.028
No	150(83.8)	70(77.8)	80(89.9)	
Shortness of breath n(%)				
Yes	30(16.8)	15(16.7)	15(16.9)	0.973
No	149(83.2)	75(83.3)	74(83.1)	
Sputum n(%)				
Yes	25(14)	14(15.6)	11(12.4)	0.537
No	154(86)	76(84.4)	78(88.6)	

Pulmonary function test data of our participants was evaluated (Table3). As a result of the independent t-test applied to our data, there was no statistically significant difference between the groups in terms of VC (lt), VC (% expected), FVC (% expected), FEV1 (lt), FEV1(% expected) and FEV1/FVC (%) averages. A statistically significant difference was found between the groups in terms of FVC (lt) (p=0.030). According to this, the mean FVC (lt) of the patients in the smoking partner group was found to be significantly lower than the non-smoker group. While the mean age of the lungs of our participants calculated automatically by the device was 55.34, the values were very close in both groups and no statistically significant results were found between the two groups (p>0.05).

For participants whose spouses smoked (n=90), when the relationship between the number of cigarettes smoked daily by the spouse and PFT parameters was examined, increase in the daily smoking amount was associated with a significant decrease in VC (lt), VC (% expected), FVC (lt), FEV1 (lt) (respectively, r= 0.249,p=0.018, r=0.208, p=0.049, r=0.242, p=0.021, r=0.243, p=0.021).

Table3. Comparison of respiratory functions of patients in the group with and without a spouse smoking

	All (n:176)	Husband smoker (n:88)	Husband non-smoker (n:88)	p- value
Spirometry				
VC (lt)	3.02 ± 0.48	2.96 ± 0.48	3.08 ± 0.48	0.100
VC (% expected)	92.5 ± 11.4	91.5 ± 11.9	93.6 ± 11.0	0.220
FVC (lt)	2.82 ± 0.48	2.74 ± 0.46	2.90 ± 0.50	0.030
FVC (% expected)	86.6 ± 12.0	84.9 ± 11.6	88.3 ± 12.2	0.055
FEV1 (lt)	2.44 ± 0.39	2.39 ± 0.35	2.24 ± 0.42	0.110
FEV1(% expected)	88.2 ± 11.5	87.3 ± 10.7	89.2 ± 12.2	0.260
FEV1/FVC (%)	86.8 ± 6.5	87.7 ± 6.8	85.9 ± 6.1	0.070
Lung Age	55.34 ± 17.87	55.0 ±18.0	55.6 ±17.8	0.800

VC: Vital Capacity, FVC: Forced Vital Capacity, FEV1: Forced Expired Volume in the first second.

Discussion

There was no significant difference between the two groups in terms of shortness of breath and sputum production. Cough complaint was found to be statistically significantly higher in the group whose husbands were smokers. Mean FVC of the women whose husband was in the smoking group was significantly lower than in the non-smoking group. In addition, as the number of cigarettes smoked daily by the spouse increased, a significant decrease was found in VC, VC expected, FVC and FEV1.

In addition to active smoking, exposure to cigarettes smoked indoors unintentionally has a similar effect on the occurrence of smoking-related diseases (8). Therefore, respiratory complaints of individuals were questioned in the present study. 40.2% of our participants had a respiratory complaint; cough was found to be statistically significantly higher in participants whose spouses smoked. Cough is an important symptom indicating moderate respiratory dysfunction (9-11). In the case of a prolonged cough in cases where the husband smokes, it may be recommended that the patient be evaluated with respiratory function tests.

In our study, when the spirometry measurements of the women whose spouses smoked were compared with the control group, there was no statistically significant difference between the two groups in FEV1 and FEV1/FVC values. Mean FVC of the women whose husband was in the smoking group was significantly lower than in the non-smoking group. The effect of passive smoking on pulmonary function tests in non-smokers has been known for a long time. The relationship between passive smoking and the development of Chronic Obstructive Pulmonary Disease (COPD) is discussed in current studies (12). In studies, the relationship of passive smoking with impaired cardiovascular function, impaired liver tests and even impaired psychological disorders are discussed (13-15). Passive smoking not only impairs respiratory functions, but also increases mortality and morbidity in the exposed person (16-18).

In addition to cigarette smoking, the amount of cigarettes smoked and factors prolonging the exposure time increase the effects of passive smoking. In one study, while there was no PFT change in young women with a smoking friend, PFT change was observed in a family member who smoked (19). In another study, it was found that the exposure was 4 times higher in those whose spouses smoked at home compared to those whose spouses did not smoke (20). It has been determined that more respiratory symptoms and lower respiratory functions occur in cases where the level of smoking in the home environment is determined to be high by measuring particulate matter (21,22). In a study by Maziak et al., when non-smokers produced an environmental cigarette exposure score by evaluating their own data reports, lung symptoms and respiratory function, a dose-response response was determined between symptoms. It was found that the same dose-response relationship was associated with exposure time, amount and intensity of cigarette use in non-smokers diagnosed with lung cancer (23). Published in 2022, PFT parameters were compared in women exposed to passive smoking for more than 10 years, and FVC was similar, while significant results were found for FEV1 (24). In our study, significant results were found with FVC. This may be because the duration of exposure to passive smoking is different. Supporting this, in our study, as the duration of smoking increased, a significant decrease was found in VC, VC (% expected), FVC and FEV1. This result can be evaluated as the level of exposure to passive smoking varying over time.

Conclusions

As a result of this study, coughing complaints were more common in the women whose husbands were smoker. Cough is an important symptom indicating moderate respiratory dysfunction. In the case of a prolonged cough in cases where the husband smokes, it may be recommended that the patient be evaluated with respiratory function tests.

Ethics Committee: The study was approved by the İstanbul Şişli Hamidiye Etfal Training and Research

Hospital's Ethics Committee (Approval Date: 05.03.2019, Approval Code: 2293).

Conflict of Interest: The authors declare that there is no conflict of interest.

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