Journal of US-China Medical Science 13 (2016) 58-63
doi: 10.17265/1548-6648/2016.02.002

Comparison of Frequency of FEV1 in Asymptomatic Smoker and Nonsmoker Doctors

Asim Shaukat, Hassan Bukhari and Adnan Maqsood

Department of Radiology, Punjab Medical College, Allied Hospital Faisalabad, Faisalabad 38000, Pakistan

Abstract: OBJECTIVE: To determine the role frequency of decreased Forced expiratory volume in 1 second (FEV1) in between asymptomatic smoker and non smoker doctors. SETTING: Allied Hospital and District Head Quarter Hospital Faisalabad. STUDY DESIGN: Descriptive case series. SAMPLE SIZE: 350. STUDY DURATION: Six month: June 1, 2014 to November 30, 2014. SAMPLING TECHNIQUE: Non-probability consecutive sampling. STUDY DESIGN: Descriptive case series. METHODS: A total of 350 doctors meeting the inclusion criteria were selected for this study. Outcome variable was decreased FEV1 in both smoker and non smoker doctors. RESULTS: The mean age of the patients was 34.9 ± 5.9 years. The mean percentage of FEV1 predicted of the patients was 89.6 ± 8.3 percent. There were 35 (10.0%) patients had decreased FEV1 and 315 (90.0%) patients had not decreased FEV1. There were 33 (94.3%) patients smoker in which FEV1 decreased and 2 (5.7%) patients non-smoker in which FEV1 decreased. CONCLUSION: It is concluded from the results of this study that frequency of decreased FEV1 was found in doctors, but it is found more in asymptomatic smokers than in non smokers. As in our study decreased FEV1 was found in 94.3% smokers and 5.7% in non smokers.

Key words: Smoking, FEV1, asymptomatic smoker, non smoker, decreased FEV1.

1. Introduction

Tobacco caused 100 million deaths in the 20th century. If current trends continue, it will cause up to one billion deaths in the 21st century. Unchecked, tobacco related deaths will increase to more than eight million per year by 2030. More than 80% of those deaths will be in low and middle income countries as 80% of the more than one billion smokers worldwide live in low and middle income countries like Pakistan [1]. It represents the most significant risk factor for chronic obstructive pulmonary disease (COPD) and relates to both amount and duration of smoking. It is unusual to develop COPD with less than ten pack years [2]. Physicians and surgeons should be more proactive in tobacco control but cigarette smoking is on rise in doctor's community. Symptoms of lung diseases secondary to smoking appear late so doctors are indifferent to hazards of smoking [3].

Corresponding author: Hassan Bukhari, FCPS (Fellowship College of Physician and Surgeons), senior registrar, research field: chest.

Spirometry can be helpful in determining effects of smoking on ventilatory functions and reduced forced expiratory volume in one second (FEV1) is more suitable utility in assessing baseline risk of COPD, lung cancer, coronary artery disease and stroke, collectively accounting for 70%-80% of premature death in smokers. Reduced FEV1 identifies undiagnosed COPD, has comparable utility to that of serum cholesterol in assessing cardiovascular risk and defines those smokers at greatest risk of lung cancer. As such, reduced FEV1 should be considered a marker that identifies smokers at greatest need of medical intervention. Smoking cessation has been shown to attenuate FEV1 decline and, if achieved before the age of 45-50 years, may not only preserve FEV1 within normal values but substantially reduce cardio respiratory complications of smoking [4].

In a study done in Karachi to determine reference values of FEV1 in Pakistani population, 504 subjects with age 15 to 65 years were evaluated and FEV1 comes out to be 2.86 ± 0.71 in non smoker urban

population on average which has to be calibrated with height, weight and age of subjects. For a male of 40 years age, 175 cm height FEV1 was 3.01 liter [5].

The GOLD guidelines can be used to interpret the results of FEV1. It proposes four stages of COPD based on Spirometry FEV1 80% predicted (Stage 1 Mild), FEV1 of 50%-80% predicted (Stage 2 Moderate), FEV1 of 30%-50% predicted (Stage 3 Severe), and FEVI 30% predicted or FEV1 50% predicted plus chronic respiratory failure (Stage 4 Very Severe) [6]. The frequency of decreased FEV1 is 8.5% out of which 94.11% were smokers and 5.8% were non smokers [7].

As stated, earlier detection of airflow obstruction and smoking cessation may result in significant health gain. There is no local study available in last five years which addressed this problem of doctor's community and provide any convincing evidence to launch some screening and preventive program for cigarette smoking.

2. Material and Methods

350 doctors meeting the following inclusion criteria from Allied Hospital and DHQ Hospital Faisalabad were explained the purpose of research and informed consent was taken.

2.1 Inclusion Criteria

(1) Male doctors.
(2) Age 25 years to 45 years.
(3) Both smokers and non smokers.

2.2 Exclusion Criteria

(1) History of asthma, COPD, TB and interstitial lung diseases.
(2) History of taking any regular medication.

The researcher himself was complete the attached proforma to reduce inter observer bias. Forced expiratory volume in first second (FEV1) was measured by Spirolab II spirometer. Weight was measured by calibrated weight scale in light clothing at same interval of time daily (9 to 10 a.m.). Height was measured by stadiometer bare footed and standing erect to nearest contimeter. Predicted values depending upon age, height, weight and race was measured by spirometer software. Our outcome variable was decreased FEV1 in both smoker and non smoker doctors.

SPSS version 17 was used for data analysis. Descriptive statistics was calculated for all quantitative variables like height, weight and FEV1 (both recorded and predicted) as mean and standard deviation and qualitative variables like decrease in FEV1 in smokers and non smokers as percentages and frequencies. Chi square test was used for the comparison of decreased FEV1 among smoker and non smoker doctors. The *P*-value less than 0.05 was taken as significant. Effect modifier like age, weight, height, and pack years were controlled by stratification. Post stratification applying Chi square test.

3. Results

The mean age of the patients was 34.9 ± 5.9 years. There were 112 (32%) patients in the age range of 25-30 years, 80 (22.9%) patients in the age range of 31-35 years, 80 (22.9%) patients in the age range of 36-40 years and 78 (22.7%) patients in the age range of 41-45 years (Table 1).

The mean height of the patients was 169.9 ± 9.3 cm. There were 72 (20.6%) patients in the height range of 150-160 cm, 113 (32.3%) patients in the height range of 161-170 cm, 99 (28.3%) patients in the height range of 171-180 cm and 78 (22.2%) patients in the height range of 181-190 cm (Table 2).

The mean weight of the patients was 66.7 ± 14.0 kg. There were 176 (50.3%) patients in the weight range of 50-60 kg, 57 (16.3%) patients in the weight range of 61-70 kg, 36 (10.3%) patients in the weight range of 71-80 kg, 54 (15.4%) patients in the weight range of 81-90 kg and 27 (7.7%) patients in the weight range of 91-100 kg (Table 3).

Table 1 Distribution of patients by age (*n* = 350).

Age (Years)	No. of patients	Percentage
25-30	112	32.0
31-35	80	22.9
36-40	80	22.9
41-45	78	22.2
Mean ± SD	34.9 ± 5.9	

Table 2 Distribution of patients by height (*n* = 350).

Height (cm)	No. of patients	Percentage
150-160	72	20.6
161-170	113	32.3
171-180	99	28.3
181-190	66	18.8
Mean ± SD	169.9 ± 9.3	

Table 3 Distribution of patients by weight (*n* = 350).

Weight (kg)	No. of patients	Percentage
50-60	176	50.3
61-70	57	16.3
71-80	36	10.3
81-90	54	15.4
91-100	27	7.7
Mean ± SD	66.7 ± 14.0	

In our study, 250 (71.4%) patients were smoker and 100 (28.6%) patients were non-smokers (Table 4). The mean pack year of the patients was 10.2 ± 7.1. There were 100 (28.6%) patients having 0 pack year (non smoker), 178 (50.8%) patients were 10-15 pack year, 56 (16.0%) patients were 16-20 pack year and 16 (4.6%) patients were in the 21-25 pack year (Table 5).

The mean FEV1 predicted of the patients was 4.5 ± 0.3 litre. There were 32 (9.1%) patients in the FEV1 predicted range of 3.5-4.0 litre, 180 (51.4%) patients in the FEV1 predicted range of 4.1-4.5 litre, 122 (35.2%) patients in the FEV1 predicted range of 4.6-5.0 litre and 15 (4.3%) patients in the FEV1 predicted range of 5.1-5.5 litre (Table 6).

The mean FEV1 recorded of the patients was 4.0 ± 0.3 litre. There were 59 (16.9%) patients in the FEV1 recorded range of 3.1-3.5 litre, 127 (36.3%) patients in the FEV1 recorded range of 3.6-4.0 litre, 102 (29.1%) patients in the FEV1 recorded range of 4.1-4.5 litre, 50 (14.3%) patients in the FEV1 recorded range of 4.6-5.0 litre and 12 (3.4%) patients in the FEV1 recorded range of 5.1-5.5 litre (Table 7).

The mean percentage of FEV1 predicted of the patients was 89.6 ± 8.3 percent. There were 35 (10.0%) patients in the FEV1 predicted range of 70%-80%, 159 (45.4%) patients in the FEV1 predicted range of 81%-90%, 124 (35.4%) patients in the FEV1 predicted range of 91%-100% and 30 (8.6%) patients in the range of 101%-110% (Table 8).

In the distribution of patients by decreased FEV1, 35 (10.0%) patients had decreased FEV1 and 315 (90.0%) patients had not decreased FEV1 (Table 9).

In the distribution of patients by decreased FEV1 between smokers and non-smokers, there were 33 (94.3%) smoker in which FEV1 decreased and 2 (5.7%) non-smoker in which FEV1 decreased with *P* value of 0.001 (Table 10).

The stratification of age with FEV1 decreased between smokers and non smokers was described in Table 11. The stratification of height with FEV1 decreased between smokers and non smokers was described in Table 12. The stratification of weight with FEV1 decreased between smokers and non smokers was

Table 4 Distribution of patients by smoker/non smoker (*n* = 350).

Smoker/non smoker	No. of patients	Percentage
Smoker	250	71.4
Non smoker	100	28.6
Total	350	100.0

Table 5 Distribution of patients by pack year (*n* = 350).

Pack year	No. of patients	Percentage
0	100	28.6
10-15	178	50.8
16-20	56	16.0
21-25	16	4.6
Mean ± SD	10.2 ± 7.1	

Table 6 Distribution of patients by FEV1 predicted (*n* = 350).

FEV1 predicted (Litre)	No. of patients	Percentage
3.5-4.0	32	9.1
4.1-4.5	180	51.4
4.6-5.0	123	35.2
5.1-5.0	15	4.3
Mean ± SD	4.5 ± 0.3	

Table 7 Distribution of patients by FEV1 recorded (*n* = 350).

FEV1 recorded (Litre)	No. of patients	Percentage
3.1-3.5	59	16.9
3.6-4.0	127	36.3
4.1-4.5	102	29.1
4.6-5.0	50	14.3
5.1-5.5	12	3.4
Mean ± SD	4.0 ± 0.3	

Table 8 Distribution of patients by percentage of predicted FEV1 (*n* = 350).

Percentage of predicted FEV1 (%)	No. of patients	Percentage
70-80	35	10.0
81-90	159	45.4
91-100	124	35.4
101-110	30	8.6
Mean ± SD	89.6 ± 8.3	

Table 9 Distribution of patients by decreased FEV1 (*n* = 350).

Decreased FEV1	No. of patients	Percentage
Yes	35	10.0
No	315	90.0
Total	350	100.0

Table 10 Comparison of FEV1 decreased between smokers and non smokers (*n* = 35).

FEV1 decreased	No. of patients	Percentage
Smokers	33	94.3
Non smokers	2	5.7
Total	35	100.0

χ^2: 9.96; df: 1; *P*: 0.001.

Table 11 Stratification of age with FEV1 decreased between smokers and non smokers (*n* = 35).

Age	Smokers	Non-smokers	Total
25-30	17	0	17
31-35	8	0	8
36-40	5	0	5
41-45	3	2	5
Total	33	2	35

χ^2: 27.8; df: 19; *P*: 0.04.

Table 12 Stratification of height with FEV1 decreased between smokers and non smokers (*n* = 35).

Height (cm)	Smokers	Non-smokers	Total
150-160	1	1	2
161-170	15	1	16
171-180	15	0	15
181-190	2	0	2
Total	33	2	35

χ^2: 12.4; df: 30; *P*: 0.03.

Table 13 Stratification of weight with FEV1 decreased between smokers and non smokers (*n* = 35).

Weight (kg)	Smokers	Non-smokers	Total
50-60	13	0	13
61-70	3	2	5
71-80	6	0	6
81-90	7	0	7
91-100	4	0	4
Total	33	2	35

χ^2: 20.4; df: 24; *P*: 0.02.

Table 14 Stratification of pack year with FEV1 decreased between smokers and non smokers (*n* = 35).

Pack year	Smokers	Non-smokers	Total
0	0	2	2
10-15	19	0	19
16-20	12	0	12
21-25	2	0	2
Total	33	2	35

χ^2: 315; df: 13; *P*: 0.001.

described in Table 13. The stratification of pack year with FEV1 decreased between smokers and non smokers was described in Table 14.

4. Discussion

Smoking is a malicious curse of world today. In Pakistan, the highest prevalence of cigarette smoking among males was seen in the age group 24-44 years, whereas in women it is not known.

Smoking related diseases kill one in ten adults globally. Smoking is the single largest preventable cause of disease and premature death. It is a prime etiologic factor in heart disease, stroke and chronic lung disease. There is mounting evidence of the harmful effect of passive smoking. Smoking causes airway obstruction, chronic expectoration and decline in lung functions. All these effects are directly proportional to number of pack years and there is definite tendency to narrowing of both the larger and smaller airways.

Spirometry can be helpful in determining effects of smoking on ventilatory functions. It is the best method to detect borderline to mild airway obstruction, which occurs early without appearance of any symptoms or

signs. FEV1 is the most important spirometric variable for assessment of airflow obstruction. Smokers have excessive loss of FEV1 of 7.4-12.6 ml/pack year for males and 4.4-7.2 ml/pack year for females [8].

The prevalence of undetected persistent airflow obstruction in middle-aged smokers is high. Earlier detection of airflow obstruction and smoking cessation may result in significant health gain [9]. Smoking cessation reduces the accelerated rate of decline of FEV1 found in smokers compared to non-smokers [10]. These results can be used to convince people to quit smoking.

Extensive literature is now available on the harmful effects of smoking [11]. Cigarette smoke has diverse effects on lung structure and function. Previous studies of lung function testing in the general population have had mixed results, with some showing no effect and others suggesting that knowledge of an abnormal lung function test doubled the likelihood of quitting smoking, even when no other interventions were applied [12].

It is likely that the reversibility of smoke-induced changes differ between smokers without chronic symptoms, smokers with non-obstructive chronic bronchitis and smokers with COPD. Smoking cessation clearly improves respiratory symptoms and bronchial hyper responsiveness, and prevents excessive decline in lung function in all three groups [13].

In our study, the mean age; mean height; mean weight; mean pack year and mean %FEV1 of the patients were 34.9 ± 5.9 years; 169.9 ± 9.3 cm; 66.7 ± 14.0 kg; 10.2 ± 7.1 pack year and 87.0 ± 10.7 percent, respectively. As compared with the study of Khan et al. [7], those are 35.08 ± 4.73 years; 170.73 ± 5.76 cm; 67.59 ± 0.08 kg; 8.51% and 93.48 ± 11.63 percent, which are comparable with our study. Additionally, the decreased FEV1 was found in 10% patients. As compared with the study of Khan et al. [7], the decreased FEV1 was found in 8.5% patients, which is comparable with our study. The decreased FEV1 in smokers was found in 94.3% patients and 5.7% in non-smokers. As compared with the study of Khan et al. [7], the decreased FEV1 in smokers was found in 94.1% patients and 5.9% in non smokers, which is comparable with our study.

On the above discussion, it is concluded that frequency of decreased FEV1 was found in doctors, but it is found more in asymptomatic smokers than non-smokers.

5. Conclusion

It is concluded from the results of this study that frequency of decreased FEV1 was found in doctors, but it is found more in asymptomatic smokers than in non smokers. As in our study, decreased FEV1 was found in 94.3% smokers and 5.7% in non smokers.

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