

Routine Office Spirometry Versus European Community Respiratory Health Study Questionnaire

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Abstract

Methods: We report spirometric findings in 108 individuals. All were to complete a short questionnaire and were studied by spirometry.

Results: Positive response to questionnaire was noticed in 66.7%; 33.3% had no clinical complain and thus negative response. The positive response was particularly common in males who were smoker or ex-smokers. All patients were studied by spirometry which showed that 70.4% had normal spirometric pattern and 29.6% had obstructive pattern. The patients' mean age was not significantly correlated to the response of questionnaire and in determining the spirometric pattern. On the contrary to the questionnaire response, the correlation between spirometric results and socio-demographic characteristics of patients was not significant. Most importantly, the study had shown no significant association between the spirometric results (obstructive or normal) and the clinical response to questionnaire.

Conclusions: Routine office spirometry has to be offered to all individuals elder than 33 years whether they have positive or negative response to questionnaire.

Key words : COPD, chronic obstructive pulmonary disease; FEV1, forced expiratory volume in 1 second; FVC, forced vital capacity.

الخلاصة

خلفية الدراسة: يتم عادة تشخيص مرض التهاب القصبات المزمن او الربو القصبي عن طريق فحص وظائف الرئتين. في هذه الدراسة تمت المقارنة بين الاستجابة لبعض الاسئلة المعدة سلفا من قبل الجمعية الاوربية لأمراض الجهاز التنفسي وبين جهاز فحص وظائف الرئتين لغرض الكشف المبكر عن الامراض الرئوية الانسدادية المزمنة.

طريقة البحث: تم بحث 108 شخص خلال سنة كاملة حيث تم سؤالهم بعض الاسئلة القياسية ومن ثم فحص وظائف الرئتين لديهم خلال فترة سنة. **النتائج:** كان هناك 66.7% من الاشخاص لديهم استجابة موجبة للأسئلة و33.3% ليس لديهم. الكثير من المجموعة الاولى كانوا ذكورا ومدخنين حاليين او مدخنين سابقين. كلا المجموعتين تمت فحص وظائف الرئتين لديهم والتي اظهرت 70.4% لديهم مظهر طبيعي و29.6% لديهم مظهر انسدادى (انغلاقي). معدل العمر لم يكن مهما للاستجابة للأسئلة او لتبيان مظهر فحص وظائف الرئتين. التدخين ونوع الجنس كان له تأثير واضح في الاستجابة للأسئلة وليس فحص وظائف الرئتين. واهم ما في هذه الدراسة انها اوضحت ان لا علاقة مهمة بين الاستجابة للأسئلة وفحص الوظائف.

الحقائق: يجب على جميع المرضى اللذين يفوق عمرهم الثالثة والثلاثين ان يقومو بفحص وظائف الرئتين بغض النظر عن الاستجابة للأسئلة. **مفردات البحث:** جهاز فحص وظائف الرئتين, الامراض الرئوية الانسدادية المزمنة.

Introduction

The core point recommended for the diagnosis of chronic obstructive lung disease is demonstration of airway obstruction on spirometry. The Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) has recommended spirometry as the gold standard for diagnosis

of COPD, even at a preclinical stage[1]. American Thoracic and European Respiratory Societies (ATS/ERS) have published guidelines on standards of spirometry[2]. Forced expiratory volume in 1 second/forced vital capacity (FEV1/FVC) ratio of <0.70 must be used for diagnosing COPD[3]. Improved recognition and care of patients with chronic obstructive pulmonary disease

(COPD) is underpinned by a need for high quality, reliable, diagnostic spirometry [4,5] since poorly performed tests and misinterpretation of the results can lead to misdiagnosis and inappropriate management, potentially putting patients at risk. Likewise, the results of spirometry testing need to be properly interpreted in the light of the clinical history and presentation – ideally at the time of testing.

There is marked variability and inconsistency in the use of spirometry to diagnose COPD[6,7]; this is related to the age of patients[7], the specialty of the clinician (primary or secondary care) [8], and the severity of the disease[9]. Factors such as cough, variable effort, sudden cut off, slow start, inconsistent effort are some of the criteria that may result in fallacies. Spirometry is useful in COPD for the following:

1	Diagnosis
2	Assessment of severity
3	Assessment of response to therapy
4	Assessment of lung age
5	Detection of upper airway obstruction

Mild and even moderate COPD can occur without complaints or symptoms[10]. Moreover, there seems to be a weak correlation between the severity of the complaints and the severity of airway obstruction[11]. In addition, there is a certain underreporting of complaints in subjects with obstructive lung disease, particularly shortness of breath[12,13].

Aim of Study

The aim of this study was to determine whether airflow obstruction could be diagnosed most effectively by routine spirometry in the target population or by a questionnaire followed by spirometry in the patients with complaints.

Patients and Methods

In this study, consecutive patients (n=108) with and without respiratory complains were recruited from inpatient ward and out patient internal medicine clinic in Merjan medical city and AL-Hussein medical city and studied by spirometry the period from January 2013 to February 2014. The target population was defined as the age group from 35 to 70 years. Participants were excluded if they have any of the following:

1. Known asthmatic or COPD.
Use of drugs e.g. bronchodilator, steroid, Montelukast, or theophylline.
2. Restrictive lung disease
All other subjects were to complete a short questionnaire pointing to signs and symptoms of COPD (Table 1). All participants were then given an appointment for a spirometry.

Table 1 Questionnaire	
Do you have one of the following complaints:	
1	Cough, lasting for at least 2 weeks?
2	Breathing difficulties during mild exercise, or at night?
3	Wheezing?
4	Any kind of nasal allergy or hay fever?
Have you suffered from one or more of these complaints during the past year?	

Spirometric Study

Using the commercially available Spirolab III (Figure 1), the minimal standards established by the

American Thoracic Society (ATS) and the European Respiratory Society (ERS) were performed. These include measurement of FVC, FEV1, and FEV1.



Figure 1.1 Spirolab III.

Before testing for forced vital capacity (FVC), the patient was instructed to make several breaths at rest. When ready, patients inspired slowly as much air as possible (opening the arms helps) and then expired all of the air as fast as possible. The cycle are repeated several times, without removing the mouthpiece, in which case Spirolab III will automatically select and show the best test and measured parameters.

Forced expiratory volume 1 (FEV1) is the volume of air that can be expelled in 1 second starting from a maximal inspiration and should be 70-80% of the forced vital capacity (FEV1/VC is 70-80%)[14].

For testing of vital capacity (VC), patients were instructed to slowly inspire as much air as possible into the lungs and then expire slowly as much air as possible.

Forced expiratory volume in 1 second/forced vital capacity (FEV1/FVC) ratio of <0.70 was used for diagnosing COPD[1].

Questionnaire

The questionnaire was short and simple and was derived from the European Community Respiratory Health Study questionnaire [15,16]. The patients were asked if they were troubled by one of the following complaints either currently or during the past year: a cough lasting for at least 2 weeks, breathing difficulties during mild exercise or during the night, wheezing, or any kind of nasal allergy or hay fever. They were also asked if they ever visited the doctor for wheezing or a long-lasting cough. If one of these questions received a positive answer, the patients were asked to undergo spirometry.

The questionnaire focused on signs and symptoms of possible COPD, not on risk factors. There was no separate question about cigarette smoking, because there is existing evidence that spirometric testing should be offered to all current smokers > 45 years of age. An extra question regarding sputum production might have added to the sensitivity of the questionnaire. However,

the European Community Respiratory Health Study found a high correlation coefficient between the factors cough and phlegm, and it was important to make the questionnaire as concise as possible.

Test Quality Control

Through a mathematical analysis (quality control) which is applied to certain

calculated indices and parameters, the spirolab III produces a series of comments, helpful for understanding the reliability of the test made. This control quality check assigns a letter for the current session as described below:

A	At least two acceptable maneuvers, with the highest two FEV1 values matching to 100 mL.
B	At least two acceptable maneuvers, with the FEV1 values matching to within 101 to 150 mL
C	At least two acceptable maneuvers, with FEV1 values matching to within 151 to 200 mL
D	Only one acceptable maneuvers, or more than one, but the FEV1 values not matching to within 200 mL (with no interpretation).
F	No acceptable maneuvers

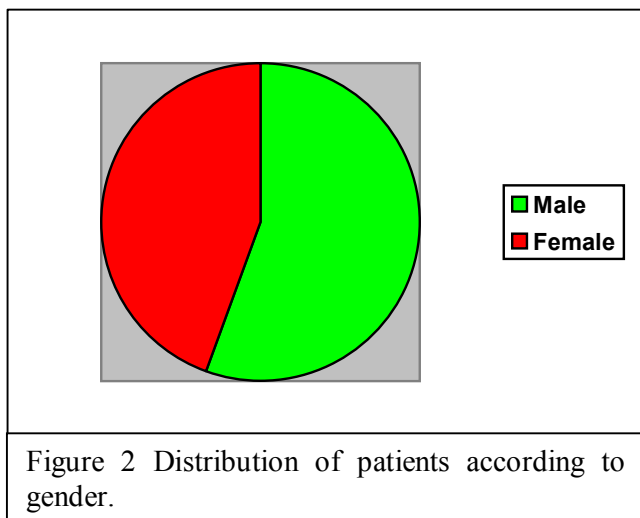
Results

The range of patients' age underwent spirometric study was

33–64 years with a mean age (\pm SD) of 45 ± 10 years (Table 2).

Variable	Mean \pm SD	Range
Age (years)	45 ± 10	33–64

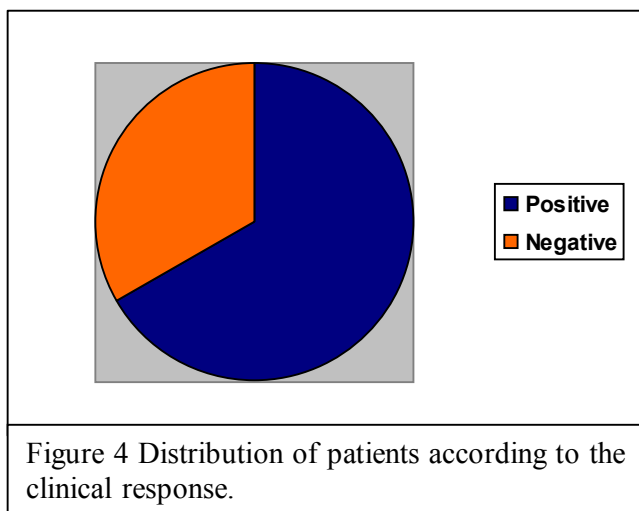
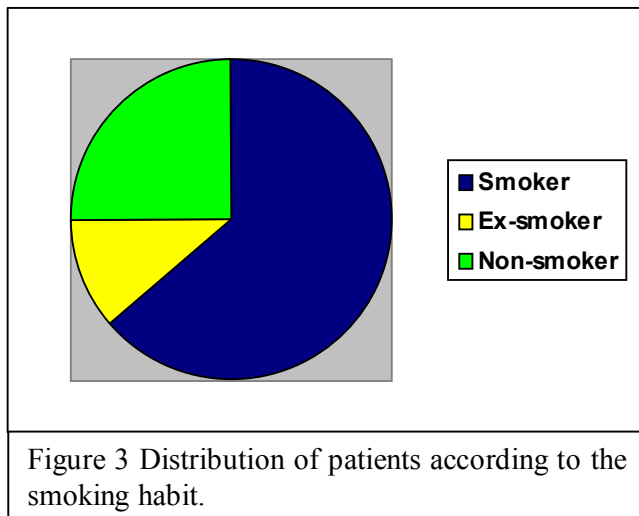
The majority of the studied patients was male and represented 55.6% while the remaining was female and represented 44.4 (Figure 2).



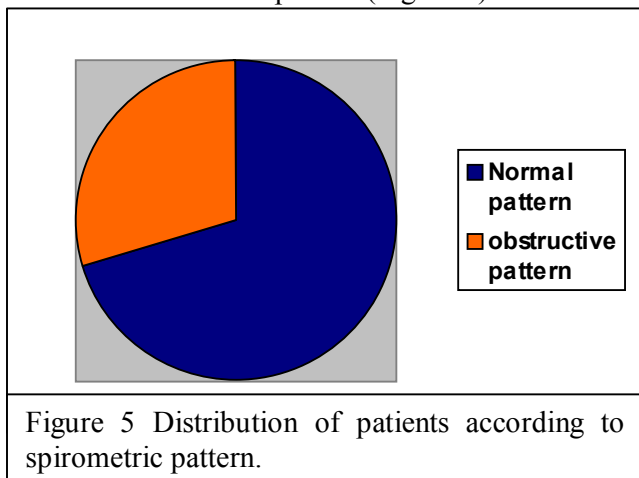
Majority of patients were smokers and represented 63.9%. The remaining were either non-smoker 25% or ex-smokers 11.1% (Figure 3).

The study had shown that 66.7% of the patients had at least one positive response to questionnaire and 33.3% of them had no clinical complain and thus

negative response. All are studied by spirometry (Figure 4).



After performing spirometric study, 70.4% had normal spirometric pattern and 29.6% had obstructive pattern (Figure 5).



The study had shown that there was no significant difference in the patients' mean age and the response to questionnaire (Table 3).

Variable	Clinical complain	N	Mean ± SD
Age (years)	Positive	72	45.33±10.34
	Negative	36	44.58±9.58

t-test 364
P value 0.717

The study had shown significant association between results of questionnaire (positive or negative) and socio-demographic characteristics of the patients (Table 4).

Characteristics	Clinical complain		P value
	Positive	Negative	
Gender			
Male	45 (62.5%)	15 (41.7%)	0.04
Female	27 (37.5%)	21 (58.3)	
Smoking habit			
Smoker	51 (70.8%)	18 (50.0%)	0.004
Ex-smoker	10 (13.9%)	2 (5.6%)	
Non-smoker	11 (15.3%)	16 (44.4%)	

The study had shown no significant association between the patients' mean age and spirometric pattern (normal or obstructive) (Table 5).

Variable	Spirometric pattern	N	Mean ± SD
Age (years)	Obstructive	32	45.33±10.03
	Normal	76	44.93±10.01

t-test 236
P value 0.814

The association between spirometric results and socio-demographic characteristics of patients was not significant (Table 6).

Characteristics	Spirometric pattern		P value
	Obstructive	Normal	
Gender			
Male	17 (53.1%)	43 (56.6%)	0.742
Female	15 (46.9%)	33 (43.4)	

Smoking habit			
Smoker	18 (56.3%)	51 (67.1%)	0.490
Ex-smoker	5 (15.6%)	7 (9.2%)	
Non-smoker	9 (28.1%)	18 (23.7%)	

The study had shown no significant association between the spirometric results (obstructive or normal) and the clinical response to questionnaire (Table 7).

Variable	Spirometric pattern		P value
	Obstructive	Normal	
Clinical complain			
Positive	18 (56.2%)	54 (71.1%)	0.136
Negative	14 (43.8%)	22 (28.9)	

Discussion

Recently there has been a great deal of interest in screening for early, asymptomatic COPD[17]. Focusing spirometry screening on smokers with chronic cough has been shown to be effective[18]. Questionnaires are also an effective approach to screening [15,16].

Our study had shown that 66.7% of the patients had at least one positive response to questionnaire and 33.3% of them had no clinical complain and thus negative response. All are studied by spirometry which showed that 70.4% had normal spirometric pattern and 29.6% had obstructive pattern. The patients' mean age was not significantly correlated to the response of questionnaire if they were elder than 33 years. This was inconsistent with Stratelis[19] G *et al* who had a screening study by invitation of smokers aged 40 to 55 years but was consistent with Price[15] DB *et al* who studied symptom-based questionnaire for identifying COPD in smokers.

The positive response to questionnaire was particularly common in males who were smoker or ex-smokers. This was inconsistent with Lehmann[20] who studied Relationship to symptoms in an adult community. Another study conducted by Burrows[21] *et al* had shown an association between symptoms and socio-demographic characteristics of patients. The patients' mean age was again not significant in determining the spirometric pattern (normal or obstructive). This was

inconsistent with Lee TA[22] *et al* who studied spirometry use in clinical practice following diagnosis of COPD.

On the contrary to the questionnaire response, the correlation between spirometric results and socio-demographic characteristics of patients was not significant. This was consistent with Hardie[23] JA *et al* who studied the risk of over-diagnosis of COPD in asymptomatic elderly never-smokers.

Most importantly, the study had shown no significant association between the spirometric results (obstructive or normal) and the clinical response to questionnaire. This was consistent with Rennard[24] S *et al* who studied the subjects' perspective of the Confronting COPD International Survey and with Van den Boom[25] G *et al* who studied the active detection of chronic obstructive pulmonary disease and asthma in the general population.

Recommendations

1. Age is not important factor in determining the response to questionnaire.
2. Smoking habit should be added to the questionnaire but together with gender add no clinical superiority to perform spirometric study.
3. Age does not influence the pattern of spirometry if the studied patients are elder than 33 years.

- Office spirometry should be offered to all patients elder than 33 years irrespective to the response of questionnaire results.

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