The majority of participants with abnormal spirometry at walk-in consult their general practitioner as recommended

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ABSTRACT

INTRODUCTION: A number of studies inviting citizens to perform spirometry without need for a previous appointment have been performed to determine the need for general screening of the population for chronic obstructive pulmonary disease (COPD). Yet, no studies have examined how many of the participants follow the advice given to consult their general practitioner (GP) afterwards.

METHODS: A walk-in spirometry was carried out on the island of Laesoe. All habitants above the age of 18 years were invited. In total, 142 were eligible for the study. Participants with an abnormal spirometry were recommended to consult their GP immediately, whereas smokers with symptoms, but with a normal spirometry, were recommended to consult their GP within a year for another spirometry. A follow-up was performed to investigate whether the participants had followed this advice.

RESULTS: In total, 52% (74/142) of the participants were advised to contact their GP: 34 due to an abnormal spirometry and 40 due to smoking and respiratory symptoms. Among the participants with an abnormal spirometry, 79% saw their GP within three months, whereas 30% of the current smokers saw their GP within 9-15 months. Lung disease was diagnosed in 56% (19/34) of the participants who initially had an abnormal spirometry.

CONCLUSIONS: Among the participants who had an abnormal spirometry at screening, 79% consulted their GP as recommended. Furthermore, 52% of the participants who had an abnormal spirometry were subsequently diagnosed with pulmonary disease by their GP. We conclude that walk-in spirometry is a useful tool for early diagnosis of COPD.

FUNDING: none.

TRIAL REGISTRATION: not relevant.

Currently, 210 million people suffer from chronic obstructive pulmonary disease (COPD) worldwide, and it is predicted to become the third leading cause of death worldwide in 2030 [1]. Previous studies have found that 20-77% of COPD patients, including patients with severe COPD, are unaware of their condition [2-4]. However, early diagnosis of COPD may prevent further disease progression [5], in particular if followed by smoking cessation [6].

Medical treatment and rehabilitation is more effective in the early than in the late stages of COPD [7]. The Danish Health and Medicines Authority recommends that all citizens aged > 35 years, who are current smokers or have a smoking history and at least one respiratory symptom, should be examined by spirometry [8]. However, previous studies have indicated that smokers feel ashamed and guilty because of their self-inflicted disease and are therefore hesitant to consult their general practitioner (GP) [9, 10]. In line herewith, Miravitlles et al showed that only 60% of people with chronic respiratory symptoms consulted a physician [3].

It has been suggested that screening the population with spirometry may identify a large proportion of undiagnosed COPD patients, especially in the early stages of the disease [11]. Recent studies of walk-in spirometry have examined the need for general population screening for COPD and the effect of this type of screening. Walk-in spirometries have been performed in the city of Aarhus [12], annually on world COPD day in Slovenia [13] and at the annual congresses of the European Respiratory Society [14]. These studies have been conducted based on voluntary participation for spirometry. However, early screening by spirometry is controversial, and the recent global initiative for COPD (GOLD) recommendations from 2015 does not advise screening [15]. To our knowledge, no previous studies have investigated whether participants take action on abnormal spirometry results in this type of screening and seek medical attention after participation in screening spirometry.

The aim of this study was to examine the compliance of the participants in a walk-in spirometry who were advised to consult their GP and to determine whether participants with an abnormal spirometry were subsequently diagnosed with pulmonary disease.

METHODS

Study population

The population of the study was identified among the participants in a walk-in spirometry conducted in 2010 on the island of Laesoe, Denmark, which counts 1,969 inhabitants [16]. Participants aged 18 years or above were eligible, although only patients alive 15 months

ORIGINAL ARTICLE

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Dan Med J 2015;62(11):A5149

after the walk-in spirometry were included in the study. A total of 158 people (8% of the habitants) participated in the walk-in spirometry. Of those, 146 participants were able to perform a spirometry that met the Danish reproducibility and acceptability criteria [17]. At the time of the follow-up, 142 participants were registered in the GP's database. These were all included in the present analyses.

The walk-in spirometry

The walk-in spirometry was performed in June 2010 by a specially trained nurse. The spirometries were performed with an EasyOne spirometer on three consecutive days in the three main towns on the island of Laesoe. Age, sex and height were recorded in addition to information on pulmonary symptoms, e.g. morning cough or periods with cough and sputum production. From the spirometry, forced expiratory volume in the first second (FEV1), forced vital capacity (FVC), FEV1 as a percentage of the expected value and the FEV1/FVC ratio were registered. Spirometries were interpreted by a physician specialised in pulmonary medicine. All participants were informed in writing about the result of their examination. All participants with pathological spirometries were advised to see their GP as soon as possible for further examination. All current smokers with symptoms, but with a normal spirometry were advised to consult their GP for another spirometry one year after the initial test, which is in line with national recommendations [8].

Follow-up

In September 2013, the patients' case records were accessed for follow-up. Data from the predefined follow-up period, June 2010 to September 2011, were recorded. It was registered whether the participants had contacted their GP, whether a diagnosis was established at the time or whether the participants had a pulmonary diagnosis before the walk-in spirometry. It was determined if the participants had had a renewed spirometry and in that case FEV1, FEV1 as a percentage of the predicted value (FEV1%pred) and the FEV1/FVC ratio were recorded, if available.

Statistical analyses

Data were analysed using Microsoft Office Excel and MYSTAT 12; a student version of SYSTAT. A chi-squared test was made to compare sex, smoking status and normal versus abnormal spirometry within the groups; FEV1 and age were analysed using a two sample t-test.

Ethical considerations

The study was presented to the local ethical committee of Northern Jutland which found no need for ethical approval. Data were recorded and stored according to the legislation of the Danish Data Protection Agency. The participants were asked whether a copy of the spirometry could be forwarded to the GP in case follow-up was recommended. All participants agreed and gave written consent to this.

Trial registration: not relevant.

RESULTS

Table 1 shows the demographic data of the total study population and the two groups. A total of 28% (40/142) were smokers who had symptoms, but also a normal spirometry.

Spirometry examinations

Abnormal spirometries were seen in 24% (34/142), with a median FEV1 of 1.9 l (1.0-2.3), a median FEV1%pred of 67 (47-73) and a median FEV1/FVC of 0.60 (0.47-0.67). In 1% (2/142) of spirometries, a restrictive pattern was seen. A total of 23% (32/142) had evidence of airway obstruction.

Diagnosis of COPD in general practice

In all, 52% (74/142) of the participants were advised to consult their GP. Of those, 46% (34/74) had an abnormal spirometry and 54% (40/74) were smokers with symptoms, but a normal spirometry at the walk-in.

Among those who had an abnormal spirometry, 79% (27/34) saw their GP. They all had another spirometry. A total of 66% (18/27) were diagnosed with lung disease. Among these, four had previously been diagnosed with COPD and 52% (14/27) received a new diagnosis. One participant was diagnosed with allergic alveolitis, two with asthma and the remaining 41% (11/27) with COPD. Of the newly diagnosed, 36% (4/11) had an FEV1%pred > 50.

Among the remaining 33% (9/27) who also saw

TABLE 1

Demographics of the participating citizens, presented as the total study population, and subgroups with abnormal lung function and smokers with symptoms.

	Total study population (N = 142)	Citizens with abnormal lung function (N = 34)	Smokers with symptoms (N = 40)
Males, n (%)	54 (38)	17 (50)	14 (35)
Age, yrs, median (range)	60 (19-95)	66 (22-93)	55 (23-85)
Smokers, current, n (%)	53 (37)	13 (38)	40 (100)
FEV1, l, median (quartiles)	2.48 (2.06-2.92)	1.9 (1.04-2.32)	2.7 (2.36-3.26)
FEV1%pred, median (quartiles)	91 (78-104)	67 (47-73)	95 (86-104)
FEV1/FVC, median (quartiles)	0.75 (0.69-0.8)	0.60 (0.47-0.67)	0.78 (0.72-0.8)

FEV1 = forced expiratory volume in 1st sec.; FEV1%pred = FEV1 in % of the predicted value; FVC = forced vital capacity.

their GP, 15% (4/27) had a normal spirometry when re-examined. In 15%, the GP's case records stated that spirometry was performed with evidence of airway obstruction; yet, the GP had not registered a diagnosis of COPD in the patient's case records. All of these patients were, however, prescribed inhaled medicine. Of those who did not see their GP, mild airway obstruction was the most frequent diagnosis at the time of the walk-in, with a median FEV1%pred of 67, and a median FEV1/FVC of 0.63.

Among the currently smoking citizens with a normal spirometry at the walk-in, 30% (12/40) saw their GP as advised. None of those got a diagnosis as a result of the follow-up, but three showed an obstructive pattern (FEV1/FVC < 0.7) at the second spirometry, and other two received inhaled medication even if they had a normal spirometry when re-examined.

Comparison of the groups

Table 2 compares the demographics and Global initiative for chronic Obstructive Lung Disease stages (GOLD stages) of those who saw and those who did not see their GP among those with an abnormal spirometry. There was a non-significant trend towards a lower FEV1 in patients with an abnormal lung function at the walk-in who consulted their GP (p = 0.085). Otherwise, there were no statistical differences between patients who followed the advice given at the walk-in and those who did not (no p-values < 0.2).

TABLE 2

Comparison of the demographics of the 34 citizens with an abnormal spirometry at the walk-in spirometry, who did and did not consult their general practitioner, respectively.

	Abnormal spirometry	
	attended (N = 27)	did not attend (N = 7)
GOLD, n (%)		
Light	6 (22)	2 (14)
Moderate	11 (41)	5 (71)
Severe	7 (26)	0 (0)
Very severe	2 (7)	0 (0)
Restrictive lung disease, n	1	1
Renewed spirometry, n	27	0
Diagnosed, n	16	1
Receiving medicine, n	16	1
Males, n (%)	13 (48)	5 (71)
Age, yrs, median (range)	65 (22-93)	68 (52-80)
Smokers, n (%)	9 (33)	4 (57)

GOLD = Global Initiative for Chronic Obstructive Lung Disease.

DISCUSSION

This study found that 24% of the participants had an abnormal lung function at the walk-in spirometry and that 79% (27/34) of those with an abnormal spirometry saw their GP as advised. Among those advised due to smoking status and symptoms, 30% subsequently saw their GP. Furthermore, 52% of the participants who had an abnormal spirometry were diagnosed with pulmonary disease by their GP as a result of the walk-in spirometry.

The prevalence of chronic obstructive pulmonary disease

This study shows that 24% of the participants had an abnormal spirometry. In a similar study performed in the city of Aarhus, Løkke et al found that 57% of the participants had an abnormal spirometry [12], and in a study in Copenhagen Lyngsoe et al found that 44% of their tested participants had COPD [18]. This high prevalence may be due to the fact that only citizens at risk of COPD were invited to participate in these studies in contrast to our study where everyone was eligible.

The estimated prevalence of COPD in Denmark is approximately 14% [19], which is lower than what we found. This could be a consequence of the age distribution in our study group, since the age distribution of the study population is higher than that of the background population. That our result is higher than the estimated prevalence may also suggest that the prevalence is higher at the island of Laesoe than on the mainland. This is supported by a health study from 2010 that reported a high proportion of smokers and former smokers on Laesoe.

Compliance after walk-in spirometry

Our study showed that 79% of the participants with an abnormal spirometry went to their GP as advised.

This is similar to the results reported by Riegel-Jakobsen et al [9] who studied compliance among citizens at risk of COPD. The high compliance suggests that an unbinding screening may be a good way to reach undiagnosed COPD patients; and this early diagnosis may prevent disease progression. Both in the present study and the study by Riegel-Jakobsen et al [9], the screening was performed by specially trained health-care personnel, and citizens with abnormal findings received personal advice to see their GP. This may explain the considerably higher compliance in the present study than public awareness campaigns are generally able to generate. No studies have previously studied the compliance of smokers with a normal lung function who receive personal advice on self-care, although Halding AG et al have shown that lower patient compliance has previously been related to smoking status [10]. In this study, almost one third of smokers with a normal spirometry followed the advice and consulted their GP, which is a considerable proportion of the smoking citizens to practice self-care.

A spirometry test, performed under the guidance of a specially trained nurse.

Approximately 52% of the participants with an abnormal spirometry were subsequently diagnosed with pulmonary disease by their GP as a direct result of their walk-in spirometry. This is much lower than the 85% observed by Riegel-Jakobsen et al [9]. The reason for this may be that Riegel-Jakobsen et al [9] interviewed the citizens by telephone to confirm whether the GP was visited and to confirm the GP´s action in terms of diagnosis and treatment, whereas we accessed the case records.

Our study has some limitations. It was performed on a small island; hence, the study population is small. Furthermore, the demographics may not match the demographics of mainland Denmark, and there is a possible selection bias as it is possible that only the resourceful chose to participate, or that citizens go to the walk-in as a group. Furthermore, information on the citizen's Medical Research Council's scale (MRC-scale), body mass index, number of exacerbations per year, smoking status (whether they were never or previous smokers), and number of pack years were not possible to retrieve; and such information could have been valuable to this study. Furthermore, the under-registration in general practice may result in under-reporting, which may have biased the results regarding the final diagnosis in general practice.

CONCLUSIONS

The vast majority of participants who have an abnormal spirometry in walk-in screening (79%) consulted their GP as recommended, and 52% got a diagnosis as a direct result of their screening. This suggests that walk-in spirometry may be a valuable tool for early diagnosis of COPD.

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ACCEPTED: 14 August 2015

CONFLICTS OF INTEREST: none. Disclosure forms provided by the authors are available with the full text of this article at www.danmedj.dk

ACKNOWLEDGEMENTS: The authors would like to extend their gratitude to the Medical Clinic, Vendsyssel Hospital, Denmark, for performing the walk-in spirometry session.

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