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CORRELATIONS BETWEEN ABSENTEEISM AND SYMPTOMS AND SIGNS OF CHRONIC BRONCHITIS

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ABSTRACT

In 1 996 workers of a large foundry the grade of bronchitis as judged from anamnestic, clinical and functional data has been compared with the total days of absenteeism (excluding accidents), the days of absenteeism due to broncho-pulmonary diseases and the number of episodes of absenteeism due to broncho-pulmonary diseases.

The respective figures show a very close correspondence to cough, phlegm, dyspnea and data of lung function. It is therefore unlikely that cough and phlegm are merely indicators of a well functioning bronchial cleaning mechanism in occupationally dust exposed subjects, but important symptoms of an important disease. Collection of data on absenteeism is much cheaper than an extensive epidemiologic field study with clinical examination and lung function tests.

Chronic bronchitis is defined by the World Health Organization as the occurrence of "productive cough on most days of at least three months each during two years". Since cough and phlegm are very frequent complaints, it may be argued, that they alone cannot be regarded as sufficient for the diagnosis of chronic bronchitis. When a diagnosis for an individual patient has to be established, the doctor will always try to obtain objective data about the patient, such as sputum or a reduced FEV_1.

However, in large epidemiologic field studies it is often necessary to restrict the examinations to a reasonable minimum. In a joint epidemiologic study in the Federal Republic of Germany, 7 Institutes have examined 13 000 industrial workers in order to assess the role of occupational dust exposure as a cause of chronic bronchitis and pulmonary emphysema. The study has shown that the excess prevalence of chronic bronchitis in dust exposed workers is about the same as in moderate smokers compared to non-dust-exposed workers and non-smokers, respectively[1].

This result was based mainly on three decision trees. One decision tree – the anamnestic-clinical decision tree – was mainly based on the answers to questions regarding cough, phlegm and dyspnea (Table 1), the second on measurements of lung function (Fig. 1), the third was a combination of these two. According to the anamnestic-clinical decision tree the effect of occupational dust exposure was

TABLE 1
Constituents of the anamnestic–clinical decision tree for chronic bronchitis.

Type 1	Type 2	Type 3
(1)		
(2)		
(1) + (2) up to 5 years	+(5)	
(3)		
(4)		+ dyspnea grade 3–5
(3) + (4) up to 5 years		+(7) numerous
(5)	(1) + (2) more than 5 years	
		+(8)
(6) 1–3 times	(1), (2), (3), or (4) daily	
(7) sporadic	(3) + (4) more than 5 years	
	(6) with phlegm, more than 3 times	
	(7) numerous	
	(8)	compensation for CNSLD

(1) = cough in the morning; (2) = cough during day or night; (3) = phlegm in the morning; (4) = phlegm during day or night; (5) = more than 1 period of at least 3 weeks with (increased) cough and phlegm; (6) = disease of the lungs or bronchi in the last 3 years with disability to work for at least 1 week; (7) = whistling and/or mucous rales; (8) = ECG signs of right heart overload.

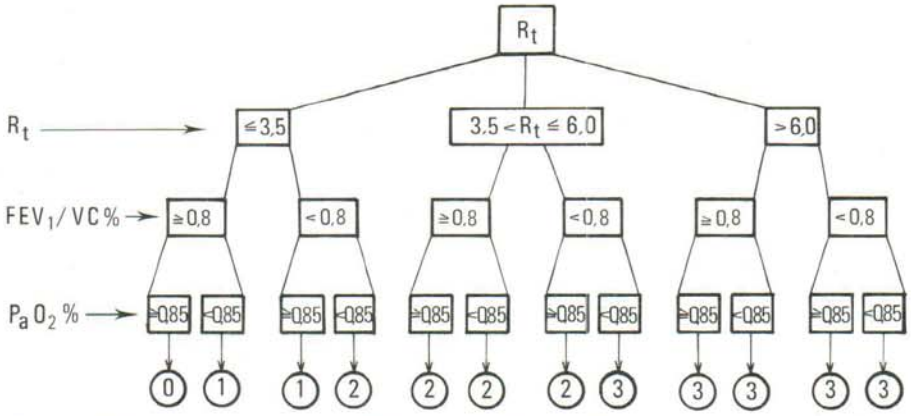

FIG. 1 – Decision tree for obstructive ventilatory disorder. R_t = airway resistance [cm H_2O/(l/s)]; FEV_1/VC % = FEV_1/VC as fraction of reference value; PaO_2 % = PaO_2 as fraction of reference value.

stronger than according to the functional decision tree. This raised some doubt, whether cough and phlegm can be acknowledged as signs of chronic bronchitis, in the sense that this disease is of clinical importance, or whether the inhalation of dust is merely a stimulus of the physiological cleaning mechanism, so that cough and phlegm are only indicators of a well functioning mucosa[2]. In order to answer this question we collected data on absenteeism and compared them to the answers on cough and phlegm[3]. If there are good correlations, cough and phlegm have to be acknowledged as true signs of a disease.

SUBJECTS AND METHODS

From 1 996 workers of a large foundry we have evaluated the health records of their health insurance. All subjects took part in a preceding epidemiologic study, where we used the questionnaire on chronic bronchitis and emphysema edited by the European Community. So we had complete data about cough, phlegm, dyspnea, clinical examination, ECG, chest X-ray and lung function measurements. From the health records we collected data about absenteeism during 7.5 years following the examination. We calculated the total number of days of absenteeism, excluding accidents and their treatment; the number of days of absenteeism due to broncho-pulmonary diseases, such as bronchitis, cold,

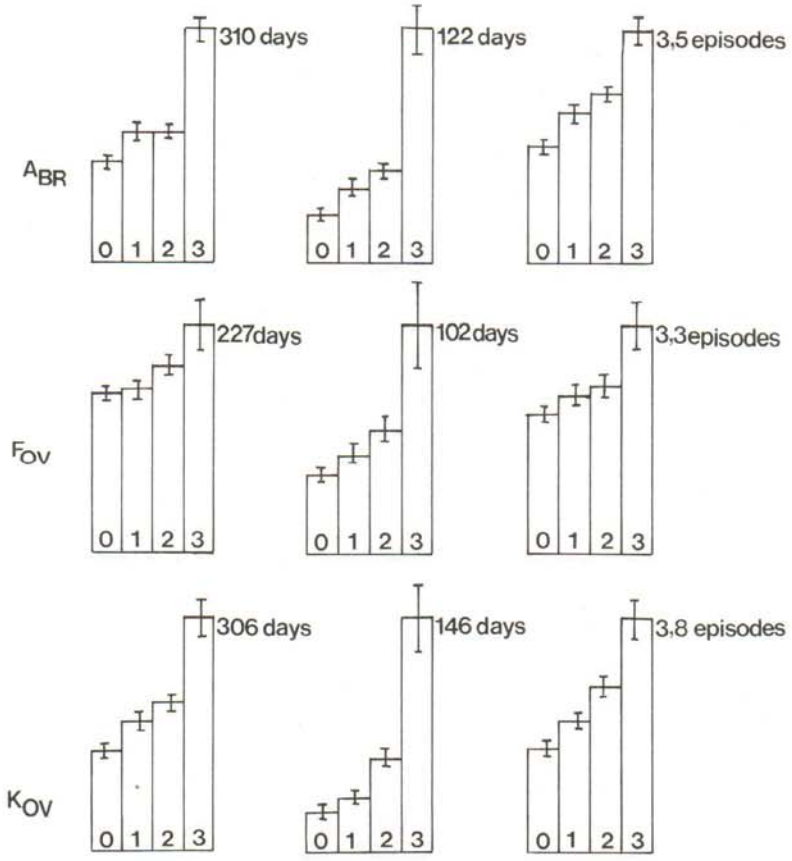

FIG. 2 – Mean values and their standard deviations for total days of absenteeism (left), days of absenteeism due to broncho-pulmonary diseases (middle) and episodes of absenteeism due to broncho-pulmonary diseases (right) for different grades (0 – 3) of bronchitis according to an anamnestic-clinical decision tree (upper columns), to a functional decision tree (middle columns) and to a combined decision tree (lower columns). The height of the highest columns of each group is normalized for easier comparison.

influenza, pneumonia, pleurisy and bronchial asthma, but excluding angina and tuberculosis. The other diagnoses mentioned have been included, because the borderline to bronchitis is often difficult to draw. We also calculated the number of episodes of broncho-pulmonary diseases. Altogether 460 workers left the foundry within this time, so that their records were not complete. Those data have been linearly extrapolated to 7.5 years.

RESULTS

The average numbers of days and episodes of absenteeism for subjects without bronchitis and with bronchitis grade 1, 2 or 3 according to the anamnestic-clinical decision tree, to the functional decision tree and to a combined decision tree are shown in Figure 2. It is obvious, that there was a marked increase from type 0 to type 3 in all decision trees for the total number of days of absenteism, as well as for the number of days and episodes of absenteeism due to broncho-pulmonary diseases. The increase in total days is about twofold, the increase in days due to broncho-pulmonary diseases is 2–5 fold, the increase in the number of episodes is about twofold.

When the number of days of absenteeism due to broncho-pulmonary diseases is divided by the number of episodes, we obtain the average duration of an episode. This has been calculated for every subject. The results are shown in

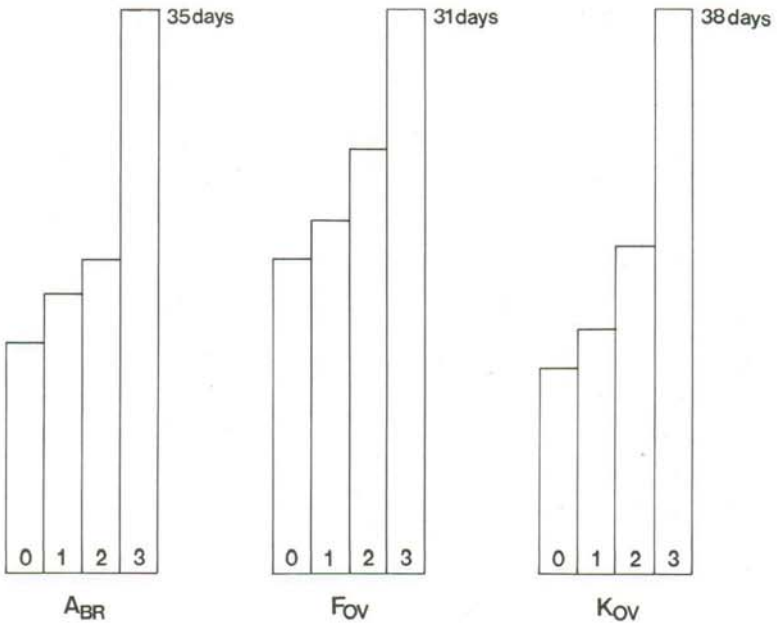

FIG. 3 – Mean duration of a single episode of absenteeism due to broncho-pulmonary diseases in groups with different grades (0–3) of bronchitis according to the three decision trees.

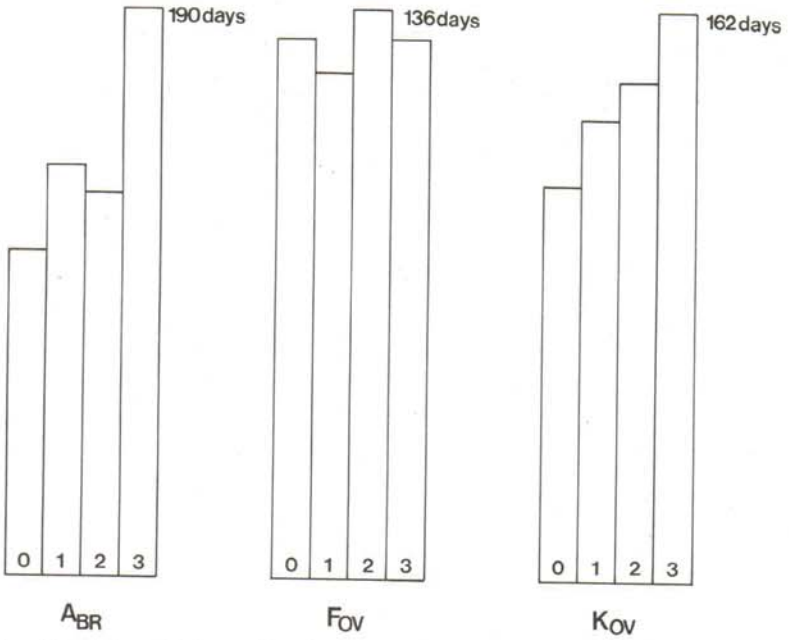

FIG. 4 – Mean days of absenteeism due to non-broncho-pulmonary diseases in groups with different grades (0–3) of bronchitis according to the three decision trees.

Figure 3. The average duration increases 2–3 fold between type 0 and type 3 of all decision trees.

When the number of days of absenteeism due to broncho-pulmonary diseases was subtracted from the total number of days of absenteeism, we get the absenteeism due to diseases other than broncho-pulmonary. This has also been done for every subject, and the averages are shown in Figure 4. For the functional decision tree there is no longer any difference between the various types. For the anamnestic-clinical and the combined decision trees there are still certain differences, but these are much smaller than for the days of absenteeism due to broncho-pulmonary diseases.

DISCUSSION

These results are in good agreement with those obtained by Van der Lende and co-workers[4]. They found episodes of absenteeism 3–6 times more frequently in subjects complaining about cough or phlegm or dyspnea than in subjects without these complaints. From an area with low air pollution 4.6% of the subjects were absent from work due to broncho-pulmonary diseases during 3 years, whereas 12.2% of the subjects from an area with high pollution were absent for the same reason at the same time. The frequency of absenteeism shows a clear increase with age.

In our data the prevalence of the more severe form of bronchitis also increases with age, so that a part of the correlation between absenteeism and grade of bronchitis is due to the correlation with age. However, when the total group is subdivided into subgroups of different ages, the relation between type of bronchitis and days and episodes of absenteeism is preserved.

It is remarkable that the days of absenteeism due to non-broncho--pulmonary diseases show no further relation to the types of the functional decision tree. This suggests that the components of the functional decision tree – FEV_1 in percent of vital capacity, airway resistance and arterial oxygen pressure – represent very well those diseases which have been summarized in this study under the term "broncho-pulmonary". Thereagainst the types according to the anamnestic-clinical decision tree and to the combined decision tree retain some relation to absenteeism due to non-broncho-pulmonary diseases. This is probably because such diseases as emphysema or heart diseases also tend to cause dyspnea and cough, but they are not comprised under the heading "broncho-pulmonary diseases". It was shown, that the number of episodes as well as the duration of the individual episodes increases with increasing grade of bronchitis. This confirms the clinical experience that patients with more advanced forms of the disease get more attacks or exacerbations and that the treatment and rehabilitation take more and more time.

All these results support the medical knowledge that in most cases cough and phlegm cannot be regarded merely as indicators of a well functioning bronchial cleaning mechanism, but that they are important symptoms of an important disease. For further epidemiological studies of the causes and prevalence of chronic bronchitis we may suggest first to collect data on absenteeism and then to decide whether a detailed anamnestic, clinical or even functional examination would give important additional information. This alternative considerably reduces the enormous expenses of epidemiological field studies.

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