RESPIRATORY SIGNS AND SYMPTOMS IN YOUNG SOLDIERS AND THEIR RELATIONSHIP TO SMOKING

BY

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One of the commonest chest diseases in this country is chronic bronchitis. It is frequently responsible for the downgrading and also the invaliding of otherwise useful soldiers. Despite this, the aetiology is only partly known. Most studies are done on middle-aged subjects in whom the disease is fully developed but who often give a ten- or twenty-year history. It should therefore be profitable to study the young in whom the disease might be starting and who may therefore be in closer contact with the original causes. In this article an attempt is made to investigate the influence of smoking in the development of what may be the early stages of chronic bronchitis.

METHOD

The following series consists entirely of men who were due for their release medical examination. They were all aged between 20 and 30 years, the majority between 20 and 22, having been in the Army two to three years. They were all members of the 16th Independent Parachute Brigade and all had a physical efficiency standard "Forward Everywhere." To enter the Brigade, in addition to being medically fit, they have to pass very strenuous physical tests, and after this are still regularly exposed to severe exertion. This might be expected to reveal any medical disability which was not discovered at the original entry examination. Anyone who broke down, or whose exercise tolerance did not remain rather above average, was posted from the Brigade and did not have his release medical examination here. It is therefore reasonable to suppose that none of the men seen had any chronic condition which might originally have developed in childhood, such as a cardiac abnormality, asthma, or the late results of acute chest infection, and which affected them now in any way.

Almost everyone had spent the last two years either in the reasonably clean air of Aldershot or the very clean air of Cyprus. For at least two years they had not been exposed to any noxious fumes nor to poor working conditions. Their living conditions had been adequate and their nutrition good.

When the men were seen for their release medical examination, a routine history was taken and clinical examination carried out. The smoking history was taken as the very last part of the examination to avoid bias, though unfortunately the discovery of nicotine-stained fingers or a smoky breath sometimes hindered this.

About a third of these men had had a miniature mass radiograph in the previous six months and all had had one within the previous three years. No abnormality had been found in anyone.
RESULTS

One hundred and forty-seven men were seen between May and November, 1957. The incidence of smoking habits and their relation to clinical abnormalities in the respiratory system are shown in Table 1.

Table 1. Relationship of smoking to symptoms and signs in the chest

<table>
<thead>
<tr>
<th>Symptoms of chest disease</th>
<th>Signs of chest disease</th>
<th>Number of cigarette smokers</th>
<th>Number of pipe smokers</th>
<th>Number given up smoking</th>
<th>Number of non-smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None</td>
<td>57 (69%)</td>
<td>5 (100%)</td>
<td>7 (100%)</td>
<td>51 (98%)</td>
</tr>
<tr>
<td>None</td>
<td>Rhonchi</td>
<td>15 (18%)</td>
<td>0</td>
<td>0</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Cough</td>
<td>None</td>
<td>2 (2%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cough</td>
<td>Rhonchi</td>
<td>3 (4%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cough and sputum</td>
<td>None</td>
<td>4 (5%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cough and sputum</td>
<td>Rhonchi</td>
<td>2 (2%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>...</td>
<td>83</td>
<td>5</td>
<td>7</td>
<td>52</td>
</tr>
</tbody>
</table>

The abnormal chest signs noted were sonorous or sibilant rhonchi. In some cases these were localised in one area and often shifted or disappeared on coughing; in others these were generalised, but even then often completely symptomless. No râles were heard.

Cough and sputum were, if present, always slight. It was also found that the interrupted, jerky type of respiration, known as "cog-wheel," was far more frequent among smokers than among non-smokers. As this is partly a subjective finding and a borderline between it and normal vesicular breathing is difficult to draw, no figures were obtained. It was, however, often possible to predict fairly confidently after auscultation that a man was a smoker because of this, even when no definite rhonchi were heard. This was particularly so in men over twenty-five.

Two men had previously reported sick with chest symptoms lasting more than a week. They had both complained of cough and sputum. In each, previous examination had shown diffuse rhonchi and a mucoid sputum, otherwise no abnormality. Chest radiographs had been normal. Both still had signs and were listed accordingly.

Table 2 shows the relation of the presence of some abnormal sign or symptom referable to the respiratory system to the number of cigarettes smoked. Most men started smoking at about 16 to 18 and have therefore smoked for from four to six years. The figures suggest that on the whole the incidence of abnormal signs and symptoms increases with increased cigarette consumption.

There was no significant correlation between any specific previous occupation and the presence of abnormal chest signs, if allowance is made for the variations in the proportion of smokers among the different occupations (Table 3).
Respiratory Signs and Symptoms in Young Soldiers

Table 2. Relationship of the number of cigarettes smoked to the number of men with respiratory abnormalities

<table>
<thead>
<tr>
<th>Number of cigarettes smoked</th>
<th>Total number of men</th>
<th>Number of men with respiratory abnormality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 per day</td>
<td>59</td>
<td>1</td>
</tr>
<tr>
<td>5 or less per day</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>10 or less per day</td>
<td>34</td>
<td>10</td>
</tr>
<tr>
<td>20 or less per day</td>
<td>38</td>
<td>15</td>
</tr>
<tr>
<td>More than 20 per day</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Pipe smokers</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>147</td>
<td>27</td>
</tr>
</tbody>
</table>

Table 3. The relationship of previous occupation to the presence of respiratory abnormality

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number of smokers, including pipe</th>
<th>Number of non-smokers</th>
<th>Number of men with respiratory abnormalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miner</td>
<td>12</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Army</td>
<td>13</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Outdoor worker</td>
<td>23</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Indoor worker</td>
<td>22</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>Merchant Navy</td>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Student</td>
<td>4</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Clerical</td>
<td>7</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Totals</td>
<td>88</td>
<td>59</td>
<td>27</td>
</tr>
</tbody>
</table>

Only a crude classification was possible owing to the small number in the series. "Army" includes those who have been in the Army for more than four years. "Indoor" workers include factory workers and engineers.

It might be of more interest to know the occupation of the father and some detail of the early home background. However, as discussed above, in this selected series this is unlikely to be important.

Eight men gave a history of previous attacks of recurrent acute bronchitis or pneumonia. Only one of these had abnormal chest signs. None admitted to having asthma. All had excellent exercise tolerance.

The men came from all parts of the country and no bias could be detected for any one area. The one non-smoker listed with chest signs (Table 1) was aged 21, an ex-engineer from Birmingham. He had no past history of chest disease and no complaints. Examination showed some sonorous, inspiratory, rhonchi in all fields.

DISCUSSION

The most surprising finding was the frequency with which occasional rhonchi were found in otherwise completely fit men. It is generally assumed that these always indicate some bronchial abnormality, either excess mucus, oedema of the wall, or bronchial spasm.
The symptoms of cough and sputum need not necessarily originate in the chest; they might be due to chronic pharyngitis or post-nasal discharge. However, in each of the listed cases the history suggested a chest origin for the symptoms.

On the whole the above figures suggest that quite a proportion of otherwise very fit young men, 18 per cent in this series, have some degree of respiratory abnormality. In a group where other possible causes are largely excluded this is almost entirely confined to smokers. Even after a comparatively short exposure, they seem to develop some sort of reaction in their bronchi to smoking.

In the above cases this reaction was usually mild and did not affect their general health. However, the following case-history is typical of a condition frequently seen.

Corporal M., who has been in the Army for six years, complains that recently he became breathless more easily than he used to and that he cannot keep up with his section when running uphill. He has had a slight morning cough, sometimes productive, for about a year. He has had no previous chest trouble such as asthma or acute bronchitis, no loss of weight, night-sweats nor hemoptyyses. He smokes 15 to 20 cigarettes a day and has done for eight years. On examination he looks fit, temperature is normal, and there is no dyspnœa or cyanosis. Diffuse inspiratory and expiratory rhonchi are heard in all lung fields. Sputum is mucoid. Chest radiograph is normal.

He is advised to stop smoking, which he does, and after two months his exercise tolerance is normal and examination of his chest shows no abnormal signs.

These men usually complain of a chronic cough or a loss of exercise tolerance, though the latter would still be considered normal in a chest clinic. They are always heavy smokers and examination of the chest often, but not always, reveals the presence of rhonchi. The chest radiograph is normal. They recover if they stop smoking. However, they often do not manage this. But just cutting smoking down seems to make no difference at all to their condition. Can this condition be called chronic bronchitis?

To make a diagnosis of chronic bronchitis the symptoms of cough and sputum must have been present for some years. There should be evidence of chronic bronchial infection with acute exacerbations and some loss of exercise tolerance. The disease is stationary or progressive but not permanently curable. The various signs and symptoms described above cannot really be covered by this label.

Waldboth (1953) described a "smokers' syndrome" in which the main symptoms are wheezing, dyspnœa, cough and loss of exercise tolerance with chronic pharyngitis. His mild cases resemble those seen here and they completely recovered after stopping smoking. However, the more severe cases did not, but the symptoms of these fitted in with usual description of chronic bronchitis. Waldboth thinks that these are just two grades of the same thing, a reaction to smoke.

Lister (1955) marshals strong evidence that the primary lesion in bronchitis is a basically allergic reaction of bronchial tissue and that the infective element is
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secondary and occurs later. This concept is supported by the pathological evidence presented by Reid (1954). She has shown that in early chronic bronchitis, histological section of bronchioles shows excess goblet cells and mucus glands and an overproduction of mucus. It is only later that purulent bronchiolitis and abscess formation occur.

Oswald (1954) stresses the importance of the interaction of mucus production and infection in the pathogenesis of bronchitis and suggests how the excess of mucus may lower the resistance of the bronchi to viruses and bacteria. It is reasonable to postulate that the pathogenesis in our cases is also some bronchial spasm and an overproduction of mucus. This may by now be allergic, or a direct foreign body reaction, the foreign body being some part of tobacco smoke. The stage is set for the development of true chronic bronchitis, but this has not yet occurred and may never do so.

However, tobacco cannot be unique in irritating the bronchi in this way. For example, Oswald & Medvei (1955) questioned civil servants in London about respiratory symptoms; 1,191 males were between 15 and 39 years of age. Of the 680 smokers, 276 (40.6 per cent) had no symptoms, 340 (50 per cent) had mild symptoms and 64 (9.4 per cent) had bronchitis. Out of 511 non-smokers 255 (49.9 per cent) had no symptoms, 235 (46 per cent) had mild symptoms and 21 (4.1 per cent) had bronchitis. While there is a difference it is not striking. Palmer (1954) also reports a series in which bronchitis is more frequent among smokers but by no means absent among non-smokers, and Fry (1954) could find no relation in a smaller series between the incidence of bronchitis and smoking habits.

Oswald, Harold, & Martin (1953) have shown that heredity, childhood infection, poverty, allergy, weather, air pollution and smoking all may play a part in the etiology of bronchitis. It is, however, very difficult to separate the effects of each of these factors and so show what part they play individually, and how they might combine to act on lung tissue.

In the Army some of these factors are absent and others affect everyone equally. It should therefore be possible to obtain adequate series for the investigation of some aspects of bronchitis in the Army, in which possible etiological factors are better known and controlled than in other walks of life.

In our series smoking was almost the only one of these factors present for the last two years, and this may explain the unequivocal results obtained in this small investigation. However, these have little other value unless they can be repeated on a much larger scale.

SUMMARY

One hundred and forty-seven men, aged between 20 and 30 years, were examined at their release medical examination for chest signs and symptoms.

Thirty-one per cent of cigarette smokers and 2 per cent of non-smokers had some mild signs. The men had not been exposed to any other form of lung irritation for at least two years.
Some evidence is given that smoking can produce more severe symptoms. The relation between smoking and chronic bronchitis is discussed.

I would like to thank Major J. L. Kilgour, M.B., Ch.B., R.A.M.C., for his encouragement.

REFERENCES


TRAUMATIC EFFUSION OF THE KNEE—A DISCUSSION

BY

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Patients suffering from chronic lesions of the knee following injury are all too familiar to any surgeon attending orthopedic out-patients. A considerable proportion have identifiable lesions amenable to specific treatment, e.g. tears of the cartilages. In many, however, no such lesions can be found and the only physical signs are wasted quadriceps muscles and effusion. This effusion, the patient will tell you, varies in size and any minor strain or undue exertion suffices to cause an exacerbation. In addition the patient may well complain that the knee “feels weak.”

Why should these effusions recur so disappointingly?

What is the rationale of treatment?

The function of the knee joint

The instability of the bony configuration of the knee is universally recognised. The elbow joint has a similar range of movement, but because of the socket shape of the trochlear notch considerable skeletal stability is achieved. The fundamental difference between the two joints perhaps depends upon the factor of weight bearing. This requires that the inferior aspect of the femoral condyles be relatively extensive, and the curvature of the condyles cannot therefore be constant—a true hinge joint being thereby impossible. Some stability is provided by the ligaments, but these are only taut in limiting positions. It appears then that the quadriceps muscle with its tendon and expansions must be the mainstay of the stability of the joint. Indeed the quadriceps expansion comes so far back (to the level of the collateral ligaments) that the muscle grips
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