Health Surveillance for Coal Workers’ Pneumoconiosis in the United Kingdom 1998–2000

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In 1959–1963 the prevalence of coal workers’ pneumoconiosis in the UK was 12%. By the end of 1997 it had fallen to 0.2%. Results for the 3 yr 1998–2000 show an increase to 0.8%. The most important causative factor is thought to be an increase in the average number of hours worked. The increased average age of miners and changes in mining practice may be contributory factors.

Keywords: coal; dust; health surveillance; mining; pneumoconiosis

INTRODUCTION

In the UK health surveillance in respect of coal workers’ pneumoconiosis (CWP) was begun in 1959 under the Periodic X-ray (PXR) Scheme. The results of screening up to the end of 1997 were reviewed by Afacan and Scarisbrick (2001). When their paper was written (in 1998) it was possible to conclude that ‘the fall in prevalence of pneumoconiosis in the UK deep coal mining industry…has continued to the point where pneumoconiosis has been almost entirely eliminated...’ The aim of this paper is to present the results of screening from the beginning of 1998 to the end of 2000.

SURVEY PROCEDURE

The target population

The ‘colliery population’ included all miners and supervisors who have been exposed to coal dust, underground or on the surface. Members of colliery management and staff who had worked underground were invited to attend. In recent years there has been a tendency for more substantial mining tasks to be undertaken by contractors, whose employees may be working at the mine for lengthy periods of time. The arrangements under which contracting companies’ employees are screened have recently been revised.

Screening procedure

Full-size PA chest X-rays are read according to the ILO classification of pneumoconioses (1980). Simple pneumoconiosis is recorded by main category (0, 1, 2 or 3), together with the subcategory of the extended classification.

At the conclusion of the survey, with the written consent of the miners concerned, cases of category 1 or greater pneumoconiosis were reported to the Health and Safety Executive (HSE), under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations.

RESULTS

To date, published PXR results have included data for directly employed members of the colliery population only, although, where appropriate, separate reports have been made to contracting companies. In this paper results for all exposed personnel, including directly employed miners, managers and staff, and contractors’ employees, have been aggregated to give an overall picture.

PXR surveys were carried out at 15 collieries during the 3 yr period 1998–2000, inclusive. Table 1 sets out for comparison a summary of the prevalence of pneumoconiosis in each of the first, third, fifth, seventh, eighth and ninth PXR rounds, together with the prevalence for the years 1998–2000. Table 1 illustrates the dramatic decrease in the size of the industry in the last four decades. It also shows that prevalence of pneumoconiosis fell progressively from 12% (56000 employees) in 1959–63 to 0.2% (13 people, all category 1) in 1994–97. In the years 1998–2000 the prevalence among those employed in the industry rose to 0.8% (35 cases) and included nine cases of category 2 or greater.

Prevalence is a cross-sectional measure, the frequency with which a condition is found in a population at a particular time. In the early rounds of the PXR this was an appropriate measure of the amount...
of disease present in the workforce. In the 1990s, with the contraction of the industry and falling prevalence of pneumoconiosis, it became more important to draw attention to new cases of the disease. Therefore, the incidence of new cases was recorded. ‘Incidence’, for this purpose, has been defined as the number of new cases diagnosed on second examination among those X-rayed on two occasions at an interval of no more than 4 yr, expressed as a rate per thousand X-rayed.

In the ninth round of the PXR the incidence of new cases was 1.4 per 1000 (all category 1). In the years 1998–2000 it rose to 6.9 per 1000 (a total of 32 cases, 23 of category 1 and nine of category ≥2). However, it must be pointed out that for the latter period the definition of incidence is less precise, because in some cases, but not all, an interval of more that 4 yr had elapsed between the relevant examinations (see Discussion below). However, it is apparent that the number of new cases of pneumoconiosis occurring among those still employed had increased.

Results for two collieries

As surveys at individual collieries were completed it became apparent that at two mines (collieries A and B) the number of miners with evidence of pneumoconiosis was greater than that at other collieries. The prevalence of all categories of pneumoconiosis at collieries A and B was 1.3 and 2.3%, respectively. Also, the cases of category ≥2 were almost all at these two sites, with prevalences of 0.5 and 1.2%, respectively.

At colliery A only a few contractors were used and all those with pneumoconiosis were miners directly employed by the mining company. In contrast, at colliery B contractors were extensively involved and the majority of those with pneumoconiosis were their employees.

Another important finding at colliery B was that many of those examined, including a number of those with pneumoconiosis, had not been examined at intervals of no more than 4 yr, as intended under the PXR scheme. The reasons for this include the fact that some miners moved from one colliery to another and, in the process, missed surveys at both pits. Contractors’ employees, particularly, have been at risk of missing the opportunity to attend for X-ray examination. Across the whole industry attendance at PXR surveys is voluntary and attendance rates have fallen, particularly over the last decade, with significant numbers of underground workers missing one or more surveys. The rapid progression of some cases of pneumoconiosis, however, cannot be explained on these grounds alone.

Her Majesty’s Inspectorate of Mines (HMIM) investigations

HMIM, of the HSE, carried out detailed investigations at collieries A and B. The investigations consisted of reviews of the use of respiratory protective equipment (RPE), reviews of respirable dust monitoring records and interviews with employees.

The main findings of the HMIM investigations were as follows.

1. Use of RPE. The use of RPE (mainly disposable dust masks) was slightly above the national average at colliery A, but significantly below the average at colliery B.

2. Dust levels. At colliery A measured dust concentrations over the 10 yr period prior to the survey were not excessive, compared with other mines, but there had been some increase in dust levels in the recent past. Colliery B was considered to be ‘dusty’.

3. Places of work. At colliery B it was noted that most of those affected had been working in headings where geological faults had occurred, so that considerable amounts of stone had to be cut through. This may have led to some increase in quartz exposure.

4. Mining methods. At colliery B it was noted that recently introduced more powerful mining machinery had made it possible to cut through rocky strata that previously would have been moved by explosives. The latter method requires the withdrawal of personnel while the shots are fired, leading to lower levels of dust exposure.

5. Working hours. At both collieries it was found that the working hours of the men who had developed pneumoconiosis were significantly longer than the standard working week. The statutory
dust exposure limit is based on a standard week. This had been exceeded by up to almost 100% in extreme cases and 7 days/week working and shifts of up to 12 h were common. Excessive working hours were considered by HMIM to be the most significant factor leading to the increased incidence of pneumoconiosis at collieries A and B.

HMIM commented (as noted above) that a number of those affected at colliery B had not been subject to health surveillance at appropriate intervals. This was recognized as a factor leading to progression to higher categories of pneumoconiosis than might otherwise have occurred.

**DISCUSSION**

The PXR was not set up as a research programme following a defined cohort of miners. The population it serves is subject to constant change. For this reason PXR results must be interpreted with caution.

The results of the first nine rounds have demonstrated a falling prevalence of pneumoconiosis. In the ninth round (1993–97) only 13 cases of pneumoconiosis were found and none of a higher category than category 1. The results for the years 1998–2000 indicate a reversal of this trend, with increases in prevalence and incidence and the reappearance of cases of category ≥2 among those still employed. As stated above, the reasons for this have been the subject of investigation by HMIM.

The possible effect of an increase in the average age of those employed must also be considered. The age range of miners in underground employment has changed over the past 40 yr. In the early part of the period a large majority remained at work until the usual retirement age of 65 yr. Later, as the industry contracted and pits closed, those leaving the industry tended to be in the older age groups, leading to a fall in the average age of those employed. In the last few years the trend has reversed; employees tend to remain in the industry longer and some who had left are returning to work.

The low prevalence of pneumoconiosis among those still employed during the ninth PXR round might have been attributable to the younger average age of working miners at that time. Evidence that this demographic change is not the sole reason for the reduction in prevalence, however, is provided by the finding that when cases of pneumoconiosis are analysed by age, the prevalence can be seen to have fallen in each age group, including the oldest. Thus it has been accepted that the improved situation up to 1997 has been due, substantially, to improved dust control.

The increase in prevalence in recent surveys might be due to the presence of larger numbers of older employees. Table 2 shows the cases diagnosed in 1998–2000 by age in 10 yr bands. The cases at the majority of collieries were aged 45 yr or older at the time of diagnosis. However, the results for collieries A and B are strikingly different, with all the cases at colliery B being in the 35–44 yr age group. It is therefore concluded that, while the changing age profile of miners across the industry may partly account for the upturn in prevalence and incidence, other factors are also at work.

Reference has already been made to the findings of the HMIM enquiries. The factor considered to have made the most important contribution to the increase in exposure, and therefore to the prevalence and incidence of pneumoconiosis, is the substantial increase in working hours of some in the industry.

**CONCLUSIONS**

Results of chest X-ray surveys at 15 collieries during the years 1998–2000 indicate that the prevalence and incidence of new cases have increased after a long period of decline. Part of this deterioration may be due to the altered age structure of the industry, with increased numbers of older miners remaining at work. Other possible contributory factors include adverse geological conditions and more powerful coal cutting machines. The most important factor appears to be the trend over recent years for miners to work longer than the standard working week on which the statutory dust limits are based. The HSE is currently reviewing the Respirable Dust Regulations. Revised dust exposure limits will take account of these findings.

**REFERENCE**