Smoking Prevalence, Behaviour and Nicotine Addiction among Coal Workers in Zonguldak, Turkey

Murat Unalacak¹, Remzi Altin², Levent Kart², Meltem Tor², Tacettin Örnek² and Hisar Altunel³

¹Department of Family Medicine, ²Department of Pulmonary Medicine, Zonguldak Karaelmas University, Faculty of Medicine and ³Turkish Coal Company Health Station, Turkey

Abstract: Smoking Prevalence, Behaviour and Nicotine Addiction among Coal Workers in Zonguldak, Turkey: Murat Unalacak, et al. Department of Family Medicine, Zonguldak Karaelmas University, Faculty of Medicine, Turkey—To assess the smoking status of coal workers, as coal dust exposure and concomitant cigarette smoking contribute to the increased prevalence of pulmonary interstitial fibrosis, chronic obstructive pulmonary disease and other pulmonary diseases. A survey was conducted to determine the smoking prevalence, behaviour and nicotine addiction in coal workers. The target population consisted of 475 underground coal workers who lived in Zonguldak city of Turkey, and we reached 389 of them. Each subject completed a detailed smoking history questionnaire (included 56 question). Chest X-rays and pulmonary function tests were performed to evaluate patients’ related diseases and complications. Smoking status of the workers was as follows; Sixty-nine never smokers (17.7%), 62 ex-smokers (15.9%) and 258 current smokers (66.3%). The mean age of starting smoking was similar among ex and current smokers (15.9 ± 4.2 versus 15.0 ± 4.0). The most common reason for starting smoking was smoking interest (50%) and friends’ influence (15.5%). The most frequent reason stated for successful smoking cessation was experience of smoking—related symptoms or development of a medical condition (51%). The most important reason given by current smokers for smoking cessation attempts was increased chance of developing lung cancer, pneumoconiosis and other diseases (22.9%). Nicotine addiction was assessed by the Fagerstroom test. Mild (0–3 points), moderate (4–6) and severe (7 or more) addiction ratios were found to be 39.1%, 44.2% and 16.7 % respectively. Ex-smokers had the highest prevalence of large and small airway obstruction on spirometry. Smoking prevalence is high in coal workers living in Zonguldak city of Turkey. Most of the smokers know that smoking is dangerous and want to quit smoking. A detailed smoking history during medical surveillance may help the occupational physician to develop a system in which such individuals can be referred to comprehensive smoking cessation programs. (J Occup Health 2004; 46: 289–295)

Key words: Coal workers, Smoking cessation, Chest X-ray abnormalities, Spirometry

Tobacco use is a global health care problem for both the general community and coal workers. Despite the differences in degree and pattern due to exposure to different fibrogenic dusts, respiratory impairments of all of the workers are associated with the presence and progression of parenchymal fibrosis and smoking1, 2).

In 2000, an estimated 8.6 million people in the United States had an estimated 12.7 million smoking-attributable conditions. According to this report, for current smokers, chronic bronchitis was the most prevalent (49%) condition, followed by emphysema (24%). Lung cancer accounted for 1% of all cigarette smoking-attributable illnesses3). Chronic bronchitis and emphysema, which are commonly called chronic obstructive pulmonary disease (COPD) is the most frequent complication of pneumoconiosis3).

The prevalence of current cigarette smoking in adults in the Turkish general population was estimated at 43.0%. US smoking prevalence in 1997 was 24.7% and a national health objective for the year 2000 was to reduce the prevalence of cigarette smoking among adults to no more than 15% in US4).

In foreign and Turkish literature, because there are not enough data about coal workers’ smoking prevalence,
behaviour and nicotine addiction, in this study we aimed to gather data about smoking prevalence, behaviour and nicotine addiction, which may help the occupational physician to identify coal workers who have difficulty in quitting and to develop a system in which such individuals can be referred to comprehensive smoking cessation programs.

Materials and Methods

Population and method

The study was performed in Zonguldak, Karadon and Gelik coalmines in 2002. The target population was 475 workers. Three hundred and eighty-nine underground coal workers, who decided to attend the study, were asked to complete a detailed smoking history questionnaire (included 56 questions), which was carried out face-to-face by three trained interviewers. Some of the questions were adapted from the study of Osinubi OYO et al). Nicotine addiction was measured by the Fagerstroem test. At the end of the interview, a pulmonary function test was done for each worker. Chest x-rays of the workers were also reread to detect and verify workers with pneumoconiosis.

Informed written consent was obtained from all subjects.

Definitions

Never smoked: Smoked less than 100 cigarettes ever, and had not smoked cigarettes within the preceding 12 months.

Ex-smoker: Smoked regularly in the past (more than 100 cigarettes)

Occasional smoker: Any individual who seldom smokes (does not smoke daily and regularly)

Current smoker: Smokes regularly and had smoked cigarettes within the preceding 12 months. Occasional smokers were classified as current smokers if they had smoked cigarettes within the preceding 12 months.

Pulmonary function tests

Pulmonary function tests (PFTs) were assessed in all patients by means of a spirometer computing system (Jaeger, Master Screen). A trained technician measured PFTs. The same physician evaluated all results. Pulmonary function testing included measurement of the forced expiratory volume in 1 s (FEV1), forced vital capacity (FVC), FEV1/FVC and the forced mid-expiratory flow rate (FEF25–75%). The following categories were defined:

Normal: FEV1>75%, FVC>75%, FEV1/FVC>75%, FEF25–75%>75%

Restrictive: FEV1<75%, FVC<75%, FEV1/FVC<75%

Major airways obstruction: FEV1<75%, FEV1/FVC<70%

Small airway obstruction: FEF25–75%<75%

Statistical Analysis

The computer software used for data analysis was SPSS for windows version 11.0 (Chicago, USA). Descriptive statistics were generated for the entire study population. Comparisons were made between never smokers, ex-smokers, and current smokers. When these comparisons involved continuous variables, analysis of variance (one-way ANOVA) was used for study variables that were applicable to all three groups. If needed, Bonferroni correction was used for multiple comparisons. If a continuous variable was only applicable to those who ever smoked (i.e., current and ex-smokers), then a two independent samples t-test was used instead. Categorical variables were compared across (2 or 3) groups with the Pearson chi-square test, unless the expected cell count for any cell in the contingency table was less than five, in which case the Fischer’s exact test was substituted. All statistical tests were conducted with a significance level of alpha=0.05 and a two sided alternative hypothesis. The values are given as the Mean ± standard deviation (SD), unless otherwise stated.

Results

Demographics and smoking characteristics of the study population

All of the workers were Caucasian males. The mean age of the subjects was 38.0. Most of the coal workers had primary school education (67.6%), 91 (23.4%) had secondary school education and 32 (8.2%) had high school education. None of them had been educated at a university. The average number of years of coal dust exposure was 8.7. The study population consisted of 69 never smokers (17.7%), 62 ex-smokers (15.9%) and 258 current smokers (66.3%). Thirty of 258 current workers (11.6%) were occasional smokers. There were no statistically significant differences between groups in age and dust exposure duration (p>0.05) (Table 1).

Characteristics of Ex, Ever and Current smokers

Current smokers had smoked more cigarettes (mean pack. years) than ex-smokers (19.8 ± 8.2 versus 16.6 ± 9.3; p<0.05). The mean age of starting cigarette smoking was similar among ex and current smokers (15.9 ± 4.2 versus 15.0 ± 4.0), but the starting age was significantly higher in occasional smokers (17.5 ± 4.0, p<0.05). The most common reason for starting smoking was smoking interest (50%) and friends’ influence (15%).

The average age of smoking cessation in ex-smokers was 32.4 ± 7.6 (range 47–19) yr. One hundred and fifty-four (59.7%) current smokers attempted to quit smoking but failed. There was a significant difference between ex-smokers (1.7 ± 1.0) and current smokers (3.0 ± 2.2) in the numbers of attempts to quit smoking (p<0.01). Ninety-five percent of ex-smokers were successful at quitting by themselves. Only 2.6% current smokers had
used some smoking cessation intervention methods (NRT, physician advice and behavioral therapy) during their quitting attempts, 5% of ex-smokers used intervention methods. The most frequent reason stated for successful smoking cessation was the experience of smoking-related symptoms or the development of a medical condition (46.8%). Some of the reasons given by current smokers for smoking cessation attempts were as follows: increased chance of developing lung cancer, pneumoconiosis and other diseases (22.9%), a general belief that smoking is bad for health (22.1%), an expensive habit (15.9%) and advice or pressure from family members (14.0%), (Table 2).

Although the majority of ex-smokers quit smoking 10 yr prior to the study, 24 ex-smokers (34.8%) were still exposed to secondhand smoke from Turkish coffee houses and household members.

### Table 1. Comparison of Age and exposure duration of the coal workers according to smoking status. The values are given as the Mean ± standard deviation (SD)

<table>
<thead>
<tr>
<th>Features</th>
<th>Never smoker</th>
<th>Ex-smoker</th>
<th>Current smoker</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>37.3 ± 7.2</td>
<td>41 ± 5.5</td>
<td>37.9 ± 7.1</td>
<td>NS*</td>
</tr>
<tr>
<td>Range</td>
<td>24 – 48</td>
<td>26 – 49</td>
<td>23 – 51</td>
<td></td>
</tr>
<tr>
<td>Exposure duration</td>
<td>11.6 ± 7.2</td>
<td>14.5 ± 5.4</td>
<td>11.6 ± 6.4</td>
<td>NS</td>
</tr>
<tr>
<td>Range</td>
<td>2 – 27</td>
<td>2 – 28</td>
<td>2 – 32</td>
<td></td>
</tr>
</tbody>
</table>

*: not significant

### Table 2. Presentation of reasons for quitting (or wanting to quit) smoking. Significant results indicated by α or β

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Ex-smoker</th>
<th>Current smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical conditions and/or symptoms&lt;sup&gt;α&lt;/sup&gt;</td>
<td>29 (46.8%)</td>
<td>25 (9.7%)</td>
</tr>
<tr>
<td>Advice from private doctor&lt;sup&gt;β&lt;/sup&gt;</td>
<td>8 (12.9%)</td>
<td>13 (5.0%)</td>
</tr>
<tr>
<td>Advice and/or pressure from spouse/family</td>
<td>9 (14.5%)</td>
<td>36 (14.0%)</td>
</tr>
<tr>
<td>No specific reasons/just wanted to quit</td>
<td>3 (4.8%)</td>
<td>13 (5.0%)</td>
</tr>
<tr>
<td>General belief that smoking is bad for health&lt;sup&gt;β&lt;/sup&gt;</td>
<td>21 (33.9%)</td>
<td>57 (22.1%)</td>
</tr>
<tr>
<td>Distaste/dislike of cigarettes</td>
<td>2 (3.2%)</td>
<td>13 (5.0%)</td>
</tr>
<tr>
<td>Cigarette smoking is an expensive habit</td>
<td>7 (11.3%)</td>
<td>41 (15.9%)</td>
</tr>
<tr>
<td>Smoking increases the chance of lung cancer, pneumoconiosis and other diseases&lt;sup&gt;β&lt;/sup&gt;</td>
<td>24 (38.7%)</td>
<td>59 (22.9%)</td>
</tr>
<tr>
<td>A family member/friend has developed smoking related illness</td>
<td>1 (1.6%)</td>
<td>2 (0.1%)</td>
</tr>
<tr>
<td>Cigarettes are addictive</td>
<td>2 (3.2%)</td>
<td>7 (2.7%)</td>
</tr>
<tr>
<td>Religious belief/conversion</td>
<td>3 (4.8%)</td>
<td>11 (4.3%)</td>
</tr>
<tr>
<td>Abnormalities in my breathing tests</td>
<td>2 (3.2%)</td>
<td>3 (1.2%)</td>
</tr>
<tr>
<td>Advice from occupational physician to quit</td>
<td>0 (0.0%)</td>
<td>5 (2.0%)</td>
</tr>
</tbody>
</table>

<sup>α</sup>: p<0.001, <sup>β</sup>: p<0.05

Characteristics of current smokers about quitting smoking

Complete information on smoking variables was available on 258 current smokers. One hundred and sixty-seven current smokers (64.7%) stated that a need existed for them to quit smoking. One hundred and fifty-four (59.7%) current smokers had made at least one attempt to quit but failed. The most common reasons given for relapse included stress outside of work (33.8%), insatiable cravings for cigarettes (30%), withdrawal symptoms (15.7%), and will weakness (12.6%). Other less common reasons included peer pressure (4.8%) and depression (3.1%).

Medical History

The medical charts of the study participants were reviewed for self-reported respiratory symptoms (Table 3). The prevalence of cough and sputum production were
significantly higher in current smokers than never smokers ($p<0.05$), but there was no difference in the prevalence of other respiratory symptoms among the smoking categories. The prevalence of self-reported chronic obstructive pulmonary disease and heart disease were significantly higher in ex-smokers than never smokers ($p<0.05$). The prevalence of a self reported history of cancer did not differ by smoking status.

**Characteristics of workers with pneumoconiosis**

There were 34 coal workers (8.7% of 389) with pneumoconiosis in the present study. Smoking status and numbers were as follows: current smoker 16 (47.1%), ex-smoker 15 (44.1%) and never smoker 3 (8.8%). A high ex-smoker ratio in workers with pneumoconiosis was due to the experience of smoking—related symptoms or the development of a medical condition.

### Table 3. Presentation of self-reported respiratory symptoms and medical history by smoking status. The significant results indicated by $\alpha$ or $\beta$.

<table>
<thead>
<tr>
<th>Respiratory symptoms and medical history</th>
<th>Never smoker (N=69)</th>
<th>Ex-smoker (N=62)</th>
<th>Current smoker (N=258)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough $^\beta$</td>
<td>4 (5.8%)</td>
<td>7 (11.2%)</td>
<td>57 (22.1%)</td>
</tr>
<tr>
<td>Sputum $^\beta$</td>
<td>3 (4.3%)</td>
<td>8 (12.9%)</td>
<td>51 (19.8%)</td>
</tr>
<tr>
<td>Hemoptyis</td>
<td>1 (1.4%)</td>
<td>5 (8.1%)</td>
<td>15 (5.8%)</td>
</tr>
<tr>
<td>Wheeze</td>
<td>4 (5.8%)</td>
<td>9 (14.5%)</td>
<td>43 (16.7%)</td>
</tr>
<tr>
<td>Chest pain</td>
<td>5 (7.2%)</td>
<td>7 (11.3%)</td>
<td>27 (10.5%)</td>
</tr>
<tr>
<td>Recurrent LRTI*</td>
<td>0 (0.0%)</td>
<td>4 (6.4%)</td>
<td>7 (2.7%)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>14 (20.3%)</td>
<td>16 (25.8%)</td>
<td>47 (18.2%)</td>
</tr>
<tr>
<td>Any respiratory symptom</td>
<td>20 (29.0%)</td>
<td>24 (38.7%)</td>
<td>75 (29.1%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4 (5.8%)</td>
<td>9 (14.5%)</td>
<td>27 (10.5%)</td>
</tr>
<tr>
<td>Heart Disease $^\alpha$</td>
<td>2 (2.9%)</td>
<td>10 (16.1%)</td>
<td>20 (7.8%)</td>
</tr>
<tr>
<td>COPD $^\alpha$</td>
<td>1 (1.5%)</td>
<td>13 (21.0%)</td>
<td>28 (10.9%)</td>
</tr>
<tr>
<td>Asthma</td>
<td>2 (2.9%)</td>
<td>5 (8.1%)</td>
<td>11 (4.3%)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>4 (5.8%)</td>
<td>6 (9.7%)</td>
<td>11 (4.3%)</td>
</tr>
<tr>
<td>Peripheral vascular diseases</td>
<td>0 (0.0%)</td>
<td>4 (6.4%)</td>
<td>7 (2.7%)</td>
</tr>
<tr>
<td>Presence or suspected cancer</td>
<td>0 (0.0%)</td>
<td>1 (1.6%)</td>
<td>3 (1.2%)</td>
</tr>
</tbody>
</table>

$^\alpha$: Analyzed by One-Way Anova Test (with Bonferroni correction). LRTI*: Lower respiratory tract infections, COPD*: Chronic obstructive pulmonary disease. $\alpha$: statistically significant difference between never smokers and ex-smokers, $p<0.05$. $\beta$: statistically significant difference between never smokers and current smokers, $p<0.05$. Analyzed by One-Way Anova Test (with Bonferroni correction).

### Table 4. Presentation of chest radiographic and pulmonary spirometric abnormalities by smoking status. Significant results indicated by $^\alpha$ or $^\beta$.

<table>
<thead>
<tr>
<th>Abnormality</th>
<th>Never smoker (N=69)</th>
<th>Ex-smoker (N=62)</th>
<th>Current smoker (N=258)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parenchymal scarring $^\alpha$, $^\beta$</td>
<td>3 (4.3%)</td>
<td>15 (24.2%)</td>
<td>14 (6.1%)</td>
</tr>
<tr>
<td>ILO $\geq 1/0$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary restriction (Mild, moderate, or severe)</td>
<td>5 (7.2%)</td>
<td>8 (12.9%)</td>
<td>14 (6.1%)</td>
</tr>
<tr>
<td>Large airway obstruction $^\alpha$ (Mild, moderate or severe)</td>
<td>1 (1.4%)</td>
<td>7 (11.3%)</td>
<td>12 (5.3%)</td>
</tr>
<tr>
<td>Small airway obstruction $^\alpha$, $^\beta$</td>
<td>5 (7.2%)</td>
<td>13 (21.0%)</td>
<td>21 (9.2%)</td>
</tr>
</tbody>
</table>

$^\alpha$: statistically significant difference between never smokers and ex-smokers, $p<0.05$. $^\beta$: statistically significant difference between ex-smokers and current smokers, $p<0.05$. Analyzed by One-Way Anova Test (with Bonferroni correction).
We examined the distribution of chest x-ray abnormalities by smoking status (Table 4). By using the ILO 1980 classification for pneumoconiosis, we found a difference in the prevalence of interstitial fibrosis (grade 1/0 or above) among the three smoking categories ($p<0.05$), which was higher in ex-smokers. Spirometry showed large airway obstruction to be highest in ex-smokers. There was a statistically significant difference between never smokers and ex-smokers ($p<0.05$) (Table 4). Abnormalities indicating small airway obstruction were found to be highest in ex-smokers. A statistically significant difference was obtained between ex-smokers and never smokers and between ex-smokers and current smokers concerning small airway obstruction ($p<0.05$) (Table 4). There was no difference concerning pulmonary restriction among the smoking categories ($p>0.05$).

Nicotine addiction and number of attempts to quit

The evaluation of nicotine addiction and number of attempts to quit in current smokers is given in Table 5. Most of the current smokers (72.4%) had mild and moderate addiction. When nicotine addiction categories and the number of attempts to quit were analysed, no difference was found between categories ($p>0.05$).

Discussion

Smoking is a major preventable cause of morbidity and mortality. Prevalence is high in most countries all over the world. In PIAR (The market investigation company) study, prevalence was found as high as 43.0% in adults of the Turkish population and prevalence was higher in males than females (62.8% versus 24.3%)\textsuperscript{4}. Another study conducted in the Turkish population showed a prevalence of 51% for males\textsuperscript{9}. Interestingly, surveys of Turkish speaking people in London demonstrated 74% of men as smokers\textsuperscript{8}. In the US, the general population has shown a decline in the proportion of smokers over the past ten years, from 28.1% in 1988 to 24.1% in 1998\textsuperscript{11, 12}. Nearly 30% of males are current smokers in some European countries\textsuperscript{13, 14}. Compared to all these countries, it is possible to say that prevalence is higher in the Turkish population than in most countries of the world.

In the literature, there is no study done on coal workers about smoking prevalence, behaviour and nicotine addiction. Smoking prevalence was found to be 66.3% in the present study, which is similar to the PIAR study\textsuperscript{4}. In the Akkaya \textit{et al.} study done in Turkish stone quarry workers smoking prevalence was found to be 78.8% which is higher than in the general Turkish community\textsuperscript{15}. According to Bang KM \textit{et al.}, the prevalence of smoking in America was highest among material moving occupations, construction laborers, and vehicle mechanics and repairers, and the lowest prevalence was found among teachers\textsuperscript{16}, which supports the effect of education on smoking. In a recent and similar study done by Osinubi OYO \textit{et al.} in asbestos workers, smoking prevalence was found to be 16%, which was lower than that of the US general population\textsuperscript{7}. So prevalence is high in our study and this may be attributed to, of course, mainly the general population characteristics, as prevalence is higher in the Turkish population than in the US.

The mean age of starting cigarette smoking in most countries all over the world is lower than 18 yr\textsuperscript{17}. In the present study, the mean age of starting cigarette smoking was below 18 yr in ex and current smokers ($15.9 \pm 4.2$ versus $15.0 \pm 4.0$). The most common reason for starting smoking was smoking interest (50%) and friends’ influence (15.5%), which is similar to that in the literature\textsuperscript{14, 18}.

The knowledge of combined pneumoconiosis and smoking health hazards may promote smoking cessation in coal-exposed workers. That is why the most frequent reason given for successful smoking cessation was the experience of smoking—related symptoms or the development of a medical condition (46.8%). And also, the most important reason given by current smokers for smoking cessation attempts was increased chance of developing lung cancer, pneumoconiosis and other diseases (22.9%). This is consistent with prior studies.

\begin{table}[h]
\centering
\caption{Table 5. The evaluation of nicotine addiction and number of attempts to quit in current smokers}
\begin{tabular}{|l|c|c|c|c|}
\hline
Addiction degree\textsuperscript{*} & Current smokers & Never attempted & Number of attempts to quit \\
\text{(Points)} & N=258 & current smokers & \\
\hline
Mild (0–3) & 101 & 39.1 & 47 & 46.5 & 1.95 ± 2.5 / (1–15) \\
Moderate (4–5) & 86 & 33.3 & 32 & 37.2 & 1.58 ± 2.5 / (1–20) \\
Severe (6 and over) & 71 & 27.6 & 24 & 33.8 & 1.89 ± 2.4 / (1–10) \\
\hline
\textit{p} value & >0.05\textsuperscript{NS} & & & \\
\hline
\end{tabular}
\begin{tablenotes}
\item\textsuperscript{*}: Determined by Fagerstroem test. \textsuperscript{**}: The ratio of never attempted current smokers to total current smokers.
\end{tablenotes}
\end{table}
that show that smokers who quit for health reasons are more likely to succeed than smokers who quit for other reasons\(^7\).\(^{19}\). Although respiratory symptoms related to smoking show individual differences, they may not be serious enough to make the person believe that he has to quit smoking. Also to comprehend the need to quit is related to the educational status of the person. The fact that most of our cases had a low educational level and so were unaware of the risks, and occupational stress factors due to high risk of death due to cave-in, firedamp explosion, the emotional stress due to working in a narrow, closed and dark place away from daylight may be the reasons for continuing smoking.

In our study, a review of medical records revealed that current smokers had a significantly higher prevalence of self-reported cough and sputum production. But, chronic obstructive pulmonary disease and heart disease and peripheral vascular disease were significantly higher in ex-smokers. In workers with pneumoconiosis, a high ex-smoker ratio (44.1\%) was found due to the presence of diseases (pneumoconiosis, chronic obstructive pulmonary disease, etc.). Parallel to this, the prevalence of small airway obstruction was also higher in ex-smokers than in both current smokers and never smokers (Table 4). This is related to the fact that smokers quit smoking mostly due to the presence of, or any symptom or any disease related to, smoking.

The vast majority of current smokers (64.7\%) stated that they felt a need to quit smoking and 59.7\% had made at least one attempt to quit within the past year. In the Siddiqui S et al. study done in the general population, about 75\% had thought of stopping smoking, and 55\% had actually attempted to stop\(^14\). In the Hughes JR study, 335 of the general population attempted to quit smoking\(^20\). Of current smokers, 2.6\% had used some smoking cessation intervention methods (NRT, physician advice and behavioural therapy) during their attempts at quitting. The study findings suggest that the primary reason for continuation of the smoking habit in the coal workers population is not lack of motivation but rather difficulty with the process of quitting.

Barriers to successful smoking cessation among current smokers in our study included social and work-related stress, cravings for cigarettes, withdrawal syndromes, will weakness, peer pressure and depression. Increasing the frequency of attempts to quit smoking will increase the likelihood of successful smoking cessation. Moreover, barriers to smoking cessation can be effectively addressed by innovative and comprehensive smoking cessation programs that are targeted at the stage of change in individual smokers. These interventions help to increase self-efficacy in future attempts to quit, thereby increasing the likelihood of successful smoking cessation. Waage et al. examined smoking intervention in subjects at risk for asbestos-related lung cancer. They noted that subjects who received smoking cessation counselling had significantly higher long term quitting rates than the control group\(^21\).

More importantly, the medical surveillance setting can identify workers having difficulty in quitting smoking. The occupational physician can act as a facilitator between the smoker coal worker and the health system\(^7\). In Turkey, the health system is different from those in Europe and the US. No one is under follow up by a primary physician. According to the laws of the Turkish Republic, each place of employment having more than 50 employees has to have an occupational physician. Primary health services and periodic health controls of the employees are held by the occupational physician. Concerning the Turkish health system, the occupational physician should refer these patients to smoking cessation clinics. It is an interesting finding in this study that occupational medical physicians have no role in quitting cigarette smoking. None of the ex-smokers quitted because of advice from an occupational medical physician. Only five current smokers (2.1\%) wanted to quit because of advice from an occupational medical physician. So this study shows that occupational physicians should also be motivated. There must be also some opportunities for the occupational physician or the place of employment to motivate the employees, especially the ones under high risk, to quit smoking. This may be by cutting some bonus payments or by awarding the ones who really quit smoking.

Approximately 34.8\% of ex-smokers in our study indicated that they were still exposed to second-hand smoke from Turkish coffee houses and members of their household. This presents an opportunity to educate all coal workers about the adverse health effects of environmental tobacco smoke (ETS).

Repetitive exposure to nicotine produces neuroadaptation, resulting in nicotine dependence. Cigarette smoking is particularly addictive due to the repeated delivery of bolus doses of nicotine to the bloodstream. Smoking cessation produces significant health benefits and is a very cost-effective intervention. Evidence that nicotine is the addictive component of tobacco provides the rationale for using nicotine replacement therapy to aid cessation. Nicotine replacement therapy doubles successful smoking cessation rates and evidence-based guidelines for the treatment of tobacco addiction recommend routine use of nicotine replacement therapy, particularly in heavily dependent smokers. Success rates of up to 40\% can be achieved in specialist clinics\(^22\). In the present study, most of the current smokers (72.4\%) had mild or moderate addiction. 27.6\% of the current smokers were heavily dependent (Table 5). According to the Fagerstroem Tolerance Questionnaire, patients having score of seven or more may get rid of smoking successfully\(^23\). The
patient ratio with a Fagerstroem score equal to or greater than seven is 17.9%. The study shows that most of the coal workers (nearly 65%) were intending to quit smoking and 59.7% of current smokers had made at least one attempt to quit smoking. But no difference was found between nicotine addiction categories and attempts to quit ($p>0.05$). Anyway, these results give us hope of preventing cigarette smoking in coal miners.

In conclusion, this study shows that the prevalence of cigarette smoking is higher in coal workers living in Zonguldak city of Turkey. The current smokers in our study have a high motivation to quit smoking. The main reason cited by ex-smokers for smoking cessation was the presence of smoking-related symptoms or a medical condition. Advice from an occupational medicine physician had no impact on the decision to quit. A feasible role of the occupational medical physician in promoting smoking cessation in this population is to incorporate smoking cessation counselling into routine medical surveillance and to develop a system in which workers who are identified as having difficulty quitting can be referred to a comprehensive smoking cessation program.

References


20) JR Hughes: Four beliefs that may impede progress in the treatment of smoking. Tob Control 8, 323–326 (1999)

