PREVALENCE OF RESPIRATORY HEALTH PROBLEMS AMONG CHERAT COAL MINERS DISTRICT NOWSHERA KHYBER PUKHTUNKHWA PAKISTAN

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ABSTRACT

BACKGROUND: The coal mining is one of the neglected sector and thus the coal miners work under hazardous conditions; and thus coal miners showed an increased prevalence of occupational health problems.  
OBJECTIVE: This study assessed the prevalence of respiratory health problems among cherat coal miners district Nowshera Pakistan, as the occupational protective measures were not according to the international standards as defined by WHO/ ILO.  
METHODOLOGY: A total of 400 coal miners were selected from the four study areas of Cherat, and then interviewed/examined for respiratory health problems along with Pulmonary Function Tests (PFTs) and Chest X-rays (CXR).  
RESULTS: The results showed that 52% of coal miners suffered from signs & symptoms of respiratory health problems; and on Pulmonary Function Tests and Chest X-Ray showed 88% and 75.2% respectively.  
CONCLUSION: It was concluded that the prevalence of respiratory health problems were high among the coal miners thus immediate remedial measures were needed in time from the concerned authorities for improving working conditions, conduct regular medical check-ups, provision of protective equipments, and dust control measures etc to reduce the burden of respiratory health problems among coal miners.  
KEY WORDS: Prevalence, Respiratory Health Problems, Pulmonary Function Tests, Chest X-rays, Coal Miners

INTRODUCTION

Globally, mining is considered as one of the most hazardous occupations in the world. A significant number of coal miners were killed or became disabled due to occupational problems and injuries. Mining, especially underground coal mining has always been a dangerous occupation and poses many health problems to coal miners. One of the important problems is production and dispersion of fine dusts in coal mines. Inhalation of respirable dust having specific chemical and mineralogical composition is dangerous to human respiratory system is the main cause of high prevalence of pneumoconiosis and related diseases among mine workers. Heavy physical work, severity of the working conditions, work place injuries and often combined occupational dust exposure, are the main causes of occupational morbidity and mortality ¹. Injuries, resulting in death, are one of the major occupational risks ². Various environmental epidemiological studies indicated that exposure to coal dust contribute to illnesses, disabilities, and deaths; and thus appropriate health care actions are required to avoid, and effectively manage the health risks associated
with harmful coal dust exposures. The coal dust not only deteriorates the environmental air quality but also poses the miners to various health hazards. The black coal dust deposit in lungs during process of respiration and then finally results in anthracosis, which has peculiar representation on Chest-X-Ray posterio-anterio view. Coal worker's pneumoconiosis can be defined as the accumulation of coal dust in the lungs and the tissue's reaction to its presence. The disease is divided into 2 categories: simple coal worker’s pneumoconiosis and complicated coal worker’s pneumoconiosis, or progressive massive fibrosis, depending on the extent of the disease. In initial stages, the coal-miners complain of no symptoms but in advanced stages resulting in signs and symptoms and thus have high prevalence of morbidity and mortality. There is positive association between coal dust exposure years and respiratory health problems prevalence. Spirometry is an important tool used for generating pneumotachographs, which are helpful in assessing conditions such as asthma, pulmonary fibrosis, cystic fibrosis, emphysema, and COPD.

In Pakistan coal mining standards are not in accordance to PELs. There are around 185 billion tons of coal reserves, out of which Khyber Pakhtunkhwa Province contributes about 90 million tons; i.e. from Hangu/Orakzai and Cherat/Nowshera; moreover the respiratory health problems are more among the coal miners of cherat and this study is conducted so to highlight the problem and to suggest measures for its control and prevention.

**MATERIALS AND METHODS**
This cross-sectional study was conducted in Shakot, Jaba Tar, Jaba Khushk and Dak Ismail Khel at Cherat, District Nowshera, KPK, Pakistan, from July 2012 to June 2013; in which 400 male coal miners were included in study for respiratory health problems. Nowshera is one of the largest cities and located about 27 Miles East of Peshawar on Grand Trunk Road, at 34°05'55N, 71°58'29E. Cherat, a hilly area, near the village of Saleh Khana and Dak Ismail Khel, is a famous cantonment of District Nowshera. In total there are 95-90 coal mines and about 900-1000 coal miners were working in Coal mines of Cherat, Nowshera, Khyber Pakhtunkhwa. A structured questionnaire was formulated to collect data for variables like age and duration of coal mining job/experience. Medical examination of 400 coal miners was conducted to assess respiratory health problems.

**RESULTS**
The demographics of the coal miners included in the study were shown in Table 1. The mean age of coal miners was 30 years with standard deviation ±1.26 while the mean job duration was 8 years with standard deviation ±1.12 as shown in Table No. 1. The different respiratory problems as assessed among the coal miners were shown in Table 2.

The Graphs 1 & 2 shows the prevalence of different respiratory health problems among coal miners (n=400) as assessed through pulmonary function tests and Chest X-Rays during medical examinations.

**Table No. 1. Demographics of Coal Miners (n = 400) of Cherat, District Nowshera**

<table>
<thead>
<tr>
<th>Age Distribution of coal Miners</th>
<th>n (400)</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20 years</td>
<td>21</td>
<td>5.3%</td>
</tr>
<tr>
<td>20-25 years</td>
<td>146</td>
<td>36.5%</td>
</tr>
<tr>
<td>25-30 years</td>
<td>69</td>
<td>17.3%</td>
</tr>
<tr>
<td>31-35 years</td>
<td>48</td>
<td>12.0%</td>
</tr>
<tr>
<td>36 years &amp; above</td>
<td>116</td>
<td>29.0%</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration of Job in Years</th>
<th>n (400)</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4 years</td>
<td>112</td>
<td>28.0%</td>
</tr>
<tr>
<td>5-8 years</td>
<td>112</td>
<td>28.0%</td>
</tr>
<tr>
<td>9-14 years</td>
<td>68</td>
<td>17.0%</td>
</tr>
<tr>
<td>15 years &amp; above</td>
<td>108</td>
<td>27.0%</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>
Table No. 2. Respiratory Health Problems among Coal Miners (n = 400)

<table>
<thead>
<tr>
<th>Health Problems</th>
<th>Presenting Complaints</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory System</td>
<td>Chest pain</td>
<td>16</td>
<td>7.7%</td>
</tr>
<tr>
<td>Problems</td>
<td>Dry cough</td>
<td>106</td>
<td>51.0%</td>
</tr>
<tr>
<td></td>
<td>Cough with sputum/ Blood</td>
<td>44</td>
<td>21.2%</td>
</tr>
<tr>
<td></td>
<td>Dyspnea/ SOB</td>
<td>50</td>
<td>20.2%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>208</td>
<td></td>
</tr>
</tbody>
</table>

Graph No. 1. Prevalence of respiratory health problems among coal miners (n=400) by pulmonary function tests

The pulmonary function tests showed the following pattern; n=293 (73.25%) showed restrictive pattern of respiratory diseases; n=63 (15.75%) showed obstructive pattern of respiratory diseases; and only n=44 (11%) showed normal pulmonary function tests as were confirmed and studies by Santo Tomas (2011) and Baur (2011). The restrictive pattern of the PFTs can be labeled as having the following health problems; Simple coal workers pneumoconiosis, Complicated coal workers pneumoconiosis, Silicosis, Tuberculosis, Sarcoidosis, Interstitial, Lungs Diseases, Lung Cancer, Metastatic Lung Diseases as studied and labeled by Graber (2011) and Wang (2007), were shown in Graph No:1.

Graph No.2. Prevalence of occupational respiratory health problems among coal miners (n=400) of Cherat by Chest X-Rays

DISCUSSIONS
The occupational respiratory health problems amongst 400 coal miners during medical examinations were: out of all chest problems; the coal miners showed high prevalence of dry cough and productive cough i.e. n=106 and n=44 respectively as were reported internationally by Kang & Kim (2010); and Vearrier & Greenberg (2011). About n=50 miners complaint of dyspnoea/shortness of breath and only few miners’ (n=16) complaint of chest pain as were studied by Graber (2011), as shown in Table No. 2.

The chest x-rays (P/A View) of 400 coal miners during medical examinations showed the following findings; Micro Nodular Opacities (1-5 mm) were found in n=119 (29.8%) of coal miners; Bilateral or unilateral Calcifications in n=85 (21.3%), Macro Nodular Opacities (>1 cm), in n=15 (3.8%) of coal miners, Hyper Inflated Lung Fields in n=82 (20.5%) of coal miners; and normal chest x-ray findings were observed in (24.8%) n=99. On the basis of CXR P/A view findings, the following diseases can be labeled; SCWP, CCWP, Silicosis, Tuberculosis, Sarcoidosis, Interstitial, Lungs Diseases, Lung Cancer, Metastatic Lung Diseases, Bronchial Asthma & COPD (Chronic Bronchitis, Emphysema) as were studied by Laney & Petsonk (2012), Antao (2005), Naidoo (2004) and Cimrin (2005) as were found and verified by this study (Graph 2).
CONCLUSIONS & SUGGESTIONS
It was concluded that the prevalence of occupational respiratory health problems was high as confirmed on pulmonary function tests and chest x-rays. The results of LFTs and CXR examination of coal miners revealed that more than 60% of workers suffered from signs & symptoms of pneumoconiosis and approximately 3.8% (n=15) were found to have advanced stages of respiratory disease. Therefore it is suggested that pre-placement and periodic medical examinations should be arranged regularly; effective dust control measures be adopted, and regular surveillance and monitoring of coal mines, and provision of personnel protective equipments (PPEs) and their compliance should be strictly maintained. Moreover, the Government, coal mine owners, private sectors as well concerned institutions should implement such measures regarding prevention and control of occupational respiratory health problems among coal miners.

REFERENCES

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