Journal of Saidu Medical College 2014; 4(2)

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

MUHAMMAD ISHTIAQ [1], NOOR JEHAN [2], ZARKA AHMAD[3], IMRANULLAH[1], KASHIF UR REHMAN KHALIL[1], SAID AKBAR KHAN [2], BUSHRA IFTIKHAR [1]

1. Department of Community Medicine, Khyber Medical College, Peshawar
2. Department of Environmental Sciences, University of Peshawar
3. Khyber Teaching Hospital, Peshawar

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 respire-able 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 [3]. The coal dust not only deteriorates the environmental air quality but also poses the miners to various health hazards [4]. 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 [5]. 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 [6].

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 [7]; 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[8], at 34°0'55N, 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 Pukhtunkhwa[9]. 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.

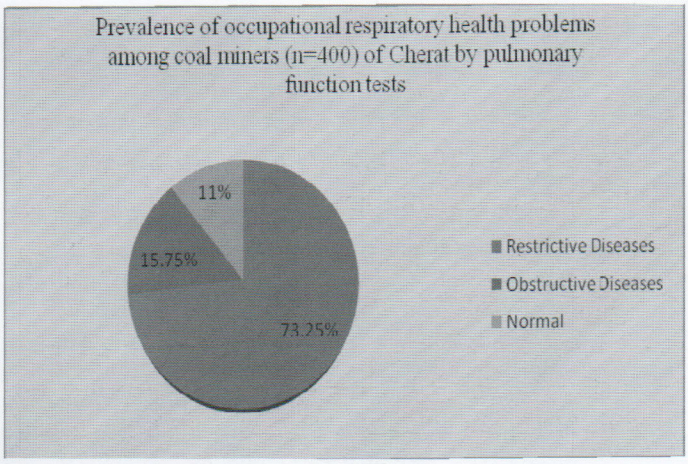
Table No. 1. Demographics of Coal Miners (n = 400) of Cherat, District Nowshera

Age Distribution of coal Miners	n (400)	%age
< 20 years	21	5.3%
20-25 years	146	36.5%
25-30 years	69	17.3%
31-35 years	48	12.0%
36 years & above	116	29.0%
Total	400	
Duration of Job in Years	n (400)	%age
1-4 years	112	28.0%
5-8 years	112	28.0%
9-14 years	68	17.0%
15 years & above	108	27.0%
Total	400	

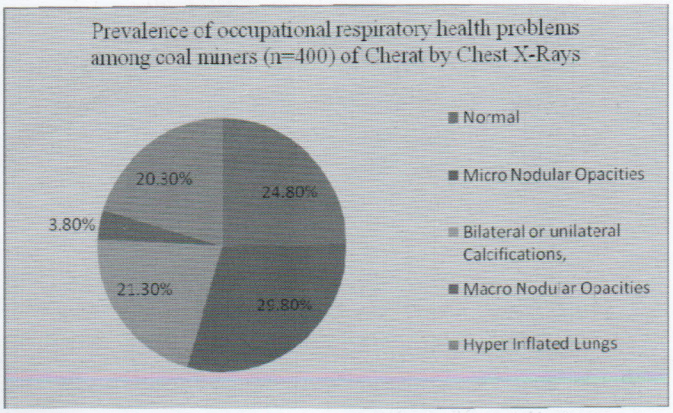
Table No: 2. Respiratory Health Problems among Coal Miners (n = 400)

Health Problems	Presenting Complaints	F	%
Respiratory System Problems	Chest pain	16	7.7%
	Dry cough	106	51.0%
	Cough with sputum/ Blood	44	21.2%
	Dyspnea/ SOB	50	20.2%
	Total	**208**	

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



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)[10]; and Vearrier & Greenberg (2011) [11]. 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)[12], as shown in Table No. 2.

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)[13] and Baur (2011)[14]. 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)[12] and Wang (2007)[15]; were shown in Graph No:1.

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)[16], Antao (2005) [17], Naidoo (2004) [18] and Cimrin (2005) [19] 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

1. David R. Faces of Coal. The Federation for American Coal, Energy and Security. 2009.p.65-78.
2. Saša Stojadinović , Igor Svrkota, Dejan Petrović, Miodrag Denić, Radoje Pantović, Vitomir Milić. Mining injuries in Serbian underground coal mines – A 10-year study. Injury 14 September 2011
3. Baker, D. and Nieuwenhuijsen, M.J. Environmental Epidemiology: Study Methods and Application. New York: Oxford University Press, 2008.
4. Mandal, K., Kumar, A., Tripathi, N., Singh, R.S., Chaulya, S.K., Mishra, P.K., and Bandyopadhyay, L.K. Council of Scientific and Industrial Research; Characterization of different road dusts in opencast coal mining areas of India. J. Environ Monit Assess., 2011.
5. Liu, X., Salter, A., Thomas, P., Leigh, J.,and Wang, H . Exhaled nitric oxide levels and lung function changes of underground coal miners in Newcastle, Australia" ;73(5):437-44.
6. Hegewald MJ, Crapo RO. Pulmonary function testing. In: Mason RJ, Broaddus VC, Martin TR, et al, eds. Murray and Nadel's Textbook of Respiratory Medicine. 5th ed. Philadelphia, Pa: Saunders Elsevier; 2010:chap 24.
7. Alam, S.M. The coal & marble as natural minerals; 2010.
8. Nowshera, Gazetteer of the NWFP, 2001.
9. EPA Report NWFP, Pakistan 2005.
10. Kang, S.K., Kim, E.A., Occupational diseases in Korea J. Korean Med Sci. 2010., 25(Suppl):S4-12.
11. Vearrier, D., and Greenberg, M.I. Occupational health of miners at altitude: adverse health effects, toxic exposures, pre-placement screening, acclimatization, and worker surveillance. J. Clin Toxicol (Phila). 2011., 49(7):629-40
12. Graber JM, Cohen RA, Basanets A, Stayner LT, Kundiev Y, Conroy L, Mukhin VV, Lysenko O, Zvinchuk A, Hryhorczuk DO. Results from a Ukrainian-US collaborative study: Prevalence and predictors of respiratory symptoms among Ukrainian coal miners. Am J Ind Med. 2013 Dec 13.
13. Santo Tomas LH. Emphysema and chronic obstructive pulmonary disease in coal miners. Curr Opin Pulm Med. 2011 Mar;17(2):123-5.
14. Baur X. Obstructive airway disorders representing occupational diseases. Pneumologie. 2011 Nov;65(11):654-61.
15. Wang ML, Wu ZE, Du QG, Peng KL, Li YD, Li SK, Han GH, Petsonk EL. Rapid decline in forced expiratory volume in 1 second (FEV1) and the development of bronchitic symptoms among new Chinese coal miners. J Occup Environ Med.2007 Oct;49(10):1143-8.
16. Laney AS, Petsonk EL, Hale JM, Wolfe AL, Attfield MD. Potential determinants of coal workers' pneumoconiosis, advanced pneumoconiosis, and progressive massive fibrosis among underground coal miners in the United States, 2005-2009. Am J Public Health. 2013 May;102 Suppl 2:S279-83.
17. Antao VC, Petsonk EL, Sokolow LZ, Wolfe AL, Pinheiro GA, Hale JM, Attfield MD. Rapidly progressive coal workers' pneumoconiosis in the United States: geographic clustering and other factors. Occup Environ Med. 2005 Oct;62(10):670-4.
18. Cimrin AH, Demiral Y, Ergör A, Uz Başaran S, Kömüs N, Ozbirsel C. Dust exposure levels and pneumoconiosis prevalence in a lignite coal miners. Tuberk Toraks. 2005;53(3):268-74.
19. Naidoo, R.N., Robins, T.G., Solomon, A., White, N., Franzblau, A. Radiographic outcomes among South African coal miners. J.Int Arch Occup Environ Health. 2004. 77(7):471-81.

CORRESPONDING ADDRESS

Name: Dr. Muhammad Ishtiaq
Address: Assistant Professor Department of Community Medicine,
Khyber Medical College, Peshawar
Cell No: 0334-9121822
Email Address: drishtiaq250@yahoo.com