

Original research article

Obstructive respiratory diseases in coal mine workers of Tribal area of Surguja, C.G.

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ABSTRACT

Introduction - Coal mine dust causes a spectrum of obstructive respiratory diseases collectively termed as coal mine dust lung disease (CMDLD). Obstructive respiratory diseases are major cause of mortality across the globe and is much prevalent in coal mine workers. The study was planned to evaluate the percentage distribution of obstructive respiratory diseases in coal mine workers of tribal area of Surguja.

Methods -Total 150 volunteer males (35 to 50 years),not having any major illness or chronic addictionand working in coal mine since 15 years, from Amera coal mines, near Lakhanpur, Surguja were evaluated for airway obstruction (FEV1), using a computerized portable spirometer (bio-net).

Observations and Result - out of 150 subjects about 124 were observed to have FEV1 less than the predicted normal suggestive of Obstructive respiratory diseases.

Conclusion - more than 50% of the total coal mine workers evaluated were having Stage 1 and Stage 2 airway obstruction and were prone to progress to severe form of Obstructive respiratory diseases.

Keywords – Obstructive; Respiratory; Coal mine workers; FEV1.

INTRODUCTION

The potential of coal mine dust to cause disabling pneumoconiosis has long been recognised, but research now suggests that pneumoconiosis is not the only respiratory hazard of coal mining. Over the last 30 years evidence has accumulated that miners also experience an excess of chronic obstructive pulmonary disease (COPD), and this has led the British Government to classify chronic bronchitis and emphysema in coal miners as an

occupational disease for which industrial injuries benefit can be paid (1).Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality across the globe (1).According to World Health Organization estimates, 65 million people have moderate to severe COPD. More than 3 million people died of COPD in 2005 corresponding to 5% of all deaths globally and it is estimated to be the third leading cause of death by 2030 (2).Coal mine dust causes a spectrum of

obstructive lung diseases collectively termed as coal mine dust lung disease (CMDLD) including coal workers' Pneumoconiosis, Silicosis, mixed dust Pneumoconiosis, dust-related diffuse fibrosis and COPD(3).COPD is characterised by progressive airflow obstruction and destruction of lung parenchyma and is caused by chronic exposure of genetically susceptible individuals to environmental factors. Airflow obstruction is defined as a reduced post broncho dilator FEV1/FVC ratio such that FEV1/FVC is less than 0.7. If FEV1 is 80% or less of predicted normal, diagnosis of COPD should only be made in the presence of respiratory symptoms such as breathlessness or cough (4).Occupational exposures in working class people specially belonging to the mining community, to vapours, gases, dusts, and fumes increase COPD risk. Studies of coal miners have shown an increased mortality due to COPD (bronchitis and emphysema). The present study was therefore planned and carried out to find out the severity and magnitude of obstructive respiratory diseases in coal mine workers of tribal area of Surguja, C.G.

MATERIALS AND METHODS

The present study of evaluation of percentage distribution of obstructive respiratory diseases in coal miners of tribal area of Surguja was conducted in the Department of Physiology, GMC Ambikapur. The anthropometric measurements, history taking and medical examination were carried out in all the subjects and the nature of the test was explained to the subjects.

Inclusion criteria– Total 150 volunteer male subjects of 35 to 50 years of age, not having any

major illness or chronic addiction, and working in coal mine since 15 years, were selected for the study from Amera coal mines, near Lakhanpur, Surguja.

Exclusion criteria - Subjects less than 35 and more than 50 years of age, suffering from any major illness and with chronic addiction and working in coal mine since less than 15 years were excluded from the study.

Data comprising of clinical history regarding name, age, sex, occupation were obtained and recorded from all the subjects. Special emphasis was given in history for finding out any symptoms suggestive of COPD.

There is no single diagnostic test for COPD. The diagnosis is therefore based on a combination of history, examination and confirmation of the presence of airflow obstruction. The pulmonary function tests were carried out using a computerized portable spirometer (bio-net) using the standard laboratory methods. Brief physical and general examination was carried out and the anthropometric parameter (name, age, sex, height, weight, occupation) were entered in the computer. The spirometer was calibrated regularly and a special emphasis was given on parameters like FEV1 and FVC which were done on the subjects comfortably in an upright position(4).

OBSERVATIONS AND RESULTS

Around 150 male subjects were evaluated during January 2017 to March 2017, over a period of about 3 months, in Dept. of Physiology, GMC Ambikapur. The lung function parameters (FEV1 and FVC) were observed to be significantly decreased in coal mine workers. Airflow obstruction is defined as a reduced post broncho

dilator FEV1/FVC ratio such that FEV1/FVC is less than 0.7. If FEV1 is 80% or less of predicted normal, diagnosis of COPD should only be made in the presence of respiratory symptoms such as breathlessness or cough. The severity of airflow

obstruction was assessed by value of FEV1 as a percentage of predicted: **(5)**.

Stage 1 - mild: 80% or less

Stage 2 - moderate: 50-79%

Stage 3 - severe: 30-49%.

Stage 4 - very severe: below 30%

Table-1: Distribution of Obstructive respiratory diseases cases during January 2017 to March2017

Sr No.	Month & Year	Total	Stage 1	Stage 2	Stage 3	Stage 4
1	Jan 2017	42	15 (35.71%)	18 (42.85%)	02 (04.76%)	00
2	Feb 20 17	61	22 (36.06%)	27 (44.26%)	01 (01.63%)	00
3	Mar 2017	47	19 (40.42%)	23 (48.93%)	00	00
4	Total	150	56 (37.33%)	68 (45.33%)	03 (02%)	00

It was observed in the present study that out of 150 subjects evaluated over a period of three months more than 50% were suffering from Stage I and Stage II airflow obstruction, which is suggestive of Obstructive respiratory disease.

DISCUSSION

Cumulative exposure to coal dust is a significant risk factor for the development of emphysema and has an additive effect to smoking. Increased coal dust exposure is associated with increased risk of death from chronic obstructive pulmonary disease (COPD). In newly employed coal miners, bronchitic symptoms are associated with a rapid decline in lung function within 2 years after starting work(6).Our findings are consistent with the results provided by A. E. Raju ET. Al. Performed in 2014 (4)and also with studies performed by Mario Cazzola published in the COPD research and Practice Journal in 2015 (7).In an early analysis based on the first round of surveys, Morgan

and colleagues found decrements in FEV₁ and forced vital capacity (FVC) in relation to years worked underground among non-smoking miners who did not have complicated pneumoconiosis(8).The strong positive exposure-response relationship between coal mine dust and pneumoconiosis-related mortality that we observed is consistent with previous studies from this and other coal miner cohort studies(9, 10). But our results were inconsistent with the report provided by Ekberg-Aronsson ET. Al. Article- Mortality in GOLD stages of COPD and its dependence on symptoms of chronic bronchitis, respiratory research performed in the year 2005; 6:98 (11).

More than 50% miners evaluated were diagnosed with Stage 1 and stage 2 obstructive disorders which is of grave concern and warrants the provision with proper medical aids along with preventive and informative measures on the disease so as to prevent further progression to severe stages.

CONCLUSION

Our study concludes that more than 50% of the total coal mine workers tested were suffering from Stage 1 and Stage 2 obstructive Pulmonary Diseases and should be given proper care at the earliest.

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