



## A Study on Morbidity Pattern Among Barytes Mine Workers in Southern India

### KEYWORDS

morbidity, hearing impairment, pneumoconioses, barytes workers

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**ABSTRACT** *The mine workers are exposed to various hazards (dust, noise, vibration, stress, etc) and suffer from many occupational and non occupational serious medical illnesses. The present study was conducted to assess the health status and morbidity pattern among barytes mine workers from south India.*

*415 mine workers were examined and data was recorded using a questionnaire. Mean age of the mine workers was 36.7 + 11.8 years. The finding of the study showed high prevalence of hearing impairment of 33.2% among these mine workers and it was relatively higher in  $\geq 20$  years of work exposure group ( $p < 0.001$ ). Pulmonary impairment was found in 13.3% workers. Other findings of the study include anemia (18%), hypertriglyceridemia (13%), hypercholesterolemia (11.8%), diabetes (11.3%) low HDL-C (6%). The visual acuity less than prescribed standards were seen in 32.2% mine workers.*

*The study concluded that along with diseases like pneumoconioses, hearing impairment, etc. the life style diseases like obesity, hypertension, diabetes, etc are also in rise among mine workers. Hence there is need of regular medical examination and industrial hygiene surveys to detect the disease at an early stage.*

### Introduction

Occupational Health is defined by the International Labour Organization (ILO) as the "promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations" [1]. According to the WHO report 2002, occupational health risk is one of the leading causes of morbidity and mortality in the world in general and developing countries [2].

Mining is one of the challenging occupation as the workers are exposed to many physical as well as chemical hazards. Exposure to excessive dust, noise, vibrations, etc are associated with mining activities which can cause various health hazards. Hence, it is required to assess the health of mine workers periodically to determine the impact of mining environment / activities on the individual employee. In India, for the assessment of well being of mine employee, medical examinations has to be conducted once every five years as prescribed under Rule 29B of Mines Rules, 1955[3].

India is one of the leading producers and exporters of barytes in the world. Barytes is used for oil and gas drilling as weighting agent in drilling mud because of its unique physical and chemical properties and magnetic neutrality. It is also used as a feedstock for production of various barium compounds, and is also utilised as filler, extender and aggregate. Another application after its conversion to barium carbonate is in the manufacture of ceramic and glass[4].

This paper deals with the findings of periodical medical examination conducted in one of the baryte mine located

in South India to determine the health status of the mine workers.

### Methodology:

The periodical medical examination was conducted among 415 mine workers. A detailed medical and occupational history was obtained. Body weight and height were measured. General examination including examination of respiratory system, circulatory system, abdomen, nervous system, locomotory system, and musculoskeletal system was carried out. The information obtained was recorded in a prescribed form.

Chest radiographs (PA view) of all the workers were taken and evaluated as per the recommendation of ILO International Classification of radiographs of Pneumoconioses 2000 [5]. Audiometry [6] and Spirometry [7] was conducted following standard procedure. For biochemical tests, blood samples were collected and assayed by standard methods for estimation of glucose, total cholesterol, triglyceride (TG) and high density lipoprotein cholesterol (HDL-C), using a semi automated analyzer. Hemoglobin estimation was done by cyanmethemoglobin method. Visual acuity was measured by using Snellen's chart at 6 meters distance. Ishihara's chart was used for the evaluation of colour blindness. The data was analyzed by using Epi-Info version 3.3.2 software.

### Results

The mean age of study population was 36.7 + 11.8 years. General profile of study subject is summarized in table - 1

Table - 1 : General profile of mine workers (n=415)

Variables	Number	Percentage
Age group		
18 - 30	151	36.3
31 - 40	116	27.9
41 - 50	71	17.1
51 - 60	77	18.5
BMI		
Underweight	27	6.5
Normal	178	42.8
Overweight	165	39.7
Obese	45	10.8
Smoking habit		
Yes	71	17.1
No	344	82.8
Work exposure		
0 - 10	264	63.6
11 - 20	39	9.3
21 - 30	51	12.2
31 - 40	61	14.6

Chest x-rays of 4 workers had evidence of pneumoconioses and 3 had evidence of suspected pneumoconioses. Tuberculosis opacities was seen in 10 workers. Spirometry was conducted among 405 workers and findings revealed 54 (13.3%) had restrictive lung impairment. Distribution of workers according to laboratory findings is illustrated in table - 2.

Table -2 Findings of Biochemical investigation

Investigations	Results	Number	Percentage
Haemoglobin (< 11.9 gm%)	Anaemia	75	18.0
	Normal	340	81.9
Blood Sugar (RBS>160 mg/dl)	High	47	11.3
	Normal	368	88.6
Cholesterol (> 250 mg/dl)	High	49	11.8
	Normal	366	88.1
Triglycerides (>200 mg/dl)	High	54	13.0
	Normal	361	86.9
HDL-C (<30mg/dl)	Low	25	6.0
	Normal	390	93.9

Hearing impairment was observed in 138 (33.2%) workers. Occurrence of other diseases in relation to age group is depicted in table 3.

Table 3 Occurrence of disease as per age group

Morbidities	Age group				Total
	18-30 (n=152)	31-40 (n=115)	41-50 (n=71)	51-60 (n=77)	
Hypertension (BP>140/90)	9 (5.9)	17 (14.7)	14 (19.7)	26 (33.7)	66 (15.9)
Respiratory diseases	1 (0.6)	5 (4.3)	9 (12.6)	2 (2.5)	17 (4.0)
Ischemic heart disease	--	2 (1.7)	7 (9.8)	1 (1.2)	10 (2.4)
Impaired visual acuity	18 (11.8)	30 (26.0)	41 (57.7)	45 (58.4)	134 (32.2)
Musculoskeletal diseases	--	--	2 (2.8)	5 (6.4)	7 (1.6)
Skin diseases	--	1 (0.8)	--	2 (2.5)	3 (0.7)

**Discussion**

There are very few studies available reporting morbidity pattern among mine workers. 50.6% were having body mass index  $\geq 25$  kg/m<sup>2</sup> indicating increased prevalence of obesity which is a leading cause for occurrence of lifestyle diseases like hypertension, diabetes, heart disease, etc. An earlier study from the south Indian population reported 27% prevalence of obesity [8].

The prevalence of pulmonary impairment was found to be 13.3% however the association of pulmonary impairment with smoking was insignificant ( $X^2 = 0.266$ ) thus indicating role of employment on impaired pulmonary function.

Hearing impairment was observed to be 75 (24.5%) in the  $\leq 20$  years work exposure group which significantly increased to 63 (57.7%) in the  $\geq 20$  years work exposure group. The Correlation between the hearing impairment and duration of work exposure was statistically significant ( $p < 0.0001$ ) indicating impact of noise caused during mining operation.

Analysis of biochemical parameter showed raised cholesterol, triglyceride and HDL-C in 11.8%, 13% and 6% respectively. High serum lipid levels are major risk factors of coronary heart diseases. Studies among general population from South India reported 18.5% and 31% prevalence of hypercholesterolemia respectively [9 -10]. 18% workers were having anemia while diabetes was present in 11.3 % and hypertension in 15.9%.

In one of the study carried out among workers from an open-cast iron ore mine with an objective to assess morbidity among the workers revealed 3.2% had abnormal Spirometry findings, diabetes 5.1%, hypertension 8.3% and dyslipidemia 37.5% respectively[11]. In another study carried out among gypsum mine workers the illiteracy rate was 10.6%. 13.3 % miners had pulmonary impairment while 22.6% Hypertension, 8.8% diabetes and 8 % musculoskeletal morbidity [12]. Findings in both the studies are more or less in line with present study showing similar morbidity pattern among mine workers.

The findings in the study showed that there is high prevalence of both the occupational and non occupational diseases which is a serious concern among mine workers. Regular periodical health examination, health education and use of personal protective equipments amongst the workers have to be encouraged. Implementation of

engineering measures to control exposure levels will significantly benefit the health and productivity of the miners. Enforcing legal regulations especially regarding environmental monitoring will ensure better working condition. Awareness regarding prevention of health hazards in mining industry should be created among the mine management by conducting training and education programmes.

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