

## Original Article

# MORBIDITY PROFILE OF EMPLOYEES WORKING IN A THERMAL POWER STATION PARALI

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## ABSTRACT

**Introduction:** Health is multi factorial. An individual's biological makeup influences health through interaction with social and physical environments as well as behavior. In Thermal power station different groups of employees are exposed to different working conditions and environmental factors at their work place; so an attempt has been made to conduct a study on the morbid conditions in employees of Thermal power station.

**Material and Method:** Cross-sectional descriptive study was done. Total 400 employees were studied. History taking included personal and socio-demographic details occupational history, presenting complaints, past history, family history and history of accidents. Interview was followed by thorough clinical examination.

**Result:** Majority of employees worked in Coal Handling Plant 90(22.5%). Respiratory system morbidities were maximum i.e. chronic bronchitis in 53 (13.25%) study subjects. Digestive system morbidities were observed in the form of acid peptic disease in 39 (9.75%) employees. Morbidities of circulatory system were hypertension was diagnosed in 55 (13.75%) study subjects. Under musculoskeletal system, common morbidities present were back pain i.e. in 22 (5.50%), followed by arthritis in 19 (4.75%). Respiratory morbidity viz. chronic bronchitis and bronchial asthma was most common morbidity.

**Conclusion:** For employee working in a power plant, it is highly advised that they must have regular health checkups.

**Keywords:** power plant employees; morbidities; respiratory morbidity; chronic bronchitis

## INTRODUCTION

Health is multi factorial and the determinants of health events are those factors, exposures, characteristics, behaviors, and contexts that determine or influence the health patterns. An individual's biological makeup influences health through interaction with social and physical environments as well as behavior.<sup>1</sup>Health is not something that one possesses as a commodity, rather a way of functioning within one's environment (work, recreation, and living). Though several types of environment exist, it is the physical environment which plays an important bearing on health. The physical factors in the working environment such as heat, cold, humidity, air movement, light, noise, vibrations, and ionizing radiation have an impact on the health of the population.<sup>2</sup>

In Thermal power station various procedures and operations are involved starting from the coal crushing to electrical energy generation. Based on these opera-

tions the workers are employed in different working sections as per the nature of work. These different groups of employees are exposed to different working conditions and environmental factors at their work place. The various environmental factors encountered at work place in Thermal power station are noise, dust, vibrations, air pollutants and high temperature. The health impact of these different working conditions and the environmental conditions associated with it are inevitable though can be modified. A reasonably large extent of morbidity is associated with this industry. The various morbid conditions in employees are respiratory illness, accidents and injuries, malignancies, cardiovascular illness, skin diseases etc

It is with this background that an attempt has been made to conduct a study on the morbid conditions in employees of Thermal power station.

**MATERIAL AND METHODS**

The present cross-sectional descriptive study was carried out at a Thermal Power station at Parali to study the health status and morbidities in employees of this power station. The present study was carried out from Nov. 2010 up to May 2012. All employees working for more than one year were included in the study. Ethical clearance from college Institutional Ethics Committee was obtained. A time schedule was prepared for the study participants.

Prevalence of respiratory morbidity from the records of hospital from thermal power station was 24%. The pilot study carried out in March-April 2011 on 60 employees. While in the pilot study Prevalence of respiratory morbidity was 16%. Based on pilot study prevalence sample size was determined which came out to be 400. Employees from various sections were included in the study. As the employees were divided unevenly into various sections as per nature of their work. This sample of 400 was allocated to various sections proportionate to the total population of the employees. Sample were selected by systematic random sampling through various sections.

The interview technique was used as a tool for data collection. Interview and physical examination was carried out at OPD in the hospital of Thermal power plant, having permission from Medical officer to carry out the study. Confidentiality of the employees were assured and maintained throughout the study. Before personal interview and physical examination, objective of the study was explained to participants and informed consent was taken. After clinical examination and available previous investigation clinical diagnosis were made. Respiratory morbidities were included conditions like chronic bronchitis; bronchial asthma; allergic rhinitis and upper respiratory tract infection. The conditions like acid peptic disease; oral ulcer; constipation; anal fissure and piles were included in gastrointestinal morbidities. Hypertension and IHD were cardiovascular morbidities. In musculoskeletal system back pain, arthritis, spondylosis, prolapsed intervertebral disc, myalgia and frozen shoulder were included. History taking included personal and socio-demographic details occupational history, presenting complaints, past history, family history and history of accidents. Interview was followed by thorough clinical examination. Employees having any morbidities were prescribed appropriate treatment at the site and if needed were asked to follow up. Data was analyzed using OPEN EPI version 2.3 and EPI INFO 7.0 statistical software.

**RESULTS**

There were 400 employees included in the study. Of these 275 (68.75%) belonged to the category of workers; 56 (14%) belonged to the supervisory staff and 69 (17.25%) were office employees.

**Table 1: Distribution of employees according to working sections**

Sections	No. of employees (%)
Coal Handling Plant	90 (22.5%)
Turbine	54 (13.5%)
Boiler	59(14.75%)
Water treatment plant	27(6.75%)
Electrical Testing	30 (7.5%)
Electrical maintenance	25 (6.25%)
chemical laboratory	17 (4.25%)
Vehicle maintenance	13 (3.25%)
Workshop	16 (4.0%)
Administration	69 (17.25%)
Total	400 (100%)

Majority of employees worked in Coal Handling Plant 90(22.5%) and among remaining workers 59 (14.75%); 54(13.5%) in Boiler & Turbine section respectively. All of the office employees were from administrative sections 69(17.25%). All office employees worked in administrative block which is 500 meter away from the plant.

**Table 2: Age wise distribution of study subjects**

Age (years)	Categories of study subjects			Total
	Worker	Supervisor	Office	
21-30	41(14.90 )	12 (21.42 )	14 (20.28 )	67 (16.75 )
31-40	202(73.45 )	33(58.92 )	51(73.91 )	286 (71.5 )
41-50	30(10.90 )	11(19.64 )	04(5.79 )	45 (11.25 )
>50	2(0.73 )	-	-	002 (0.50 )
Total	275(100 )	56(100 )	69(100 )	400 (100 )

Mean-35.38 years, S.D. ± 4.86, Range: 24-54 years

Figure in parenthesis indicate percentage

Maximum, 286 (71.50%) employees belonged to the age group 31-40 years. The mean age was 35.38 years with a standard deviation of 4.86 years and the range being 24 - 54 years.

It is seen that 241 (60.25%) employees were having duration of service between 6-15 years and 76 (19.0%) employees were having duration of service above 16 years. There were 83 (31.75%) employees who were having duration of service less than 5 years. Mean years of duration of service was 10.64 years with standard deviation of 2.56 years and the range being 1-30 years.

**Table 3: Morbidities among employees**

Morbid conditions	Number (n=400) (%)
Respiratory problem	77 (19.25)
Musculoskeletal problem	58 (14.50)
Gastrointestinal system	56 (14)
Cardiovascular system	67 (16.75)
Diabetes	08 (2)

There were total 257 (64.25%) employees who were having one or other personal habits. Out of those who were having personal habits, maximum 140 (35.0%) were having habit of smokeless tobacco. Habit of smoking only was present among 37 (9.25%) study subjects. There were 30 (7.50%) employees who were

having all the 3 habits of smoking; smokeless tobacco consumption and alcohol. Out of all employees only 143 (35.75%) employees did not have any habit.

Respiratory system morbidities were maximum i.e. chronic bronchitis in 53 (13.25%) study subjects, followed by bronchial asthma in 14 (3.50%), allergic rhinitis in 10 (2.50%) and URI in 6 (1.50%) of employees. Digestive system morbidities were observed in the form of acid peptic disease in 39 (9.75%), oral ulcer in 8 (2.0%), and constipation in 6 (1.50%), employees. Morbidities of circulatory system were hypertension was diagnosed in 55 (13.75%) study subjects. Ischemic heart disease was present in 12 (3.0%) employees. Under musculoskeletal system, common morbidities present were back pain i.e. in 22 (5.50%), followed by arthritis in 19 (4.75%), Prolapsed intervertebral disc in 3 (0.75%). Hearing loss was present among 9 (2.25%) study subjects. Diabetes mellitus in 8 (2.0%) and Hypothyroidism in 1 (0.25%) of study subjects was found.

**Table 4: Most Common Morbidity among employees according to section**

Sections	Most common morbidity	Frequency (%)
Coal Handling Plant	Chronic bronchitis	23 (25.5)
Turbine	Acute Peptic Disease	8 (14.8)
Boiler	Chronic bronchitis	9 (15.25)
Water Treatment Plant	Hypertension	4 (14.81)
Electrical Testing	Hypertension	4 (13.3)
Electrical maintenance	Acute Peptic Disease	2 (8.0)
chemical laboratory	Allergic rhinitis	4 (23.52)
Vehicle maintenance	Back pain	2 (14.28)
Workshop	Hypertension	3 (17.64)
Administration	Hypertension	14 (20.89)

In Coal handling plant 23 (25.5%) employees had chronic bronchitis and was the leading morbid condition. In turbine section acute peptic disease was present in 8 (14.8%) employees and followed by sensorineural hearing loss in 7(12.96%) employees were leading morbid conditions. In Boiler section leading morbid condition was chronic bronchitis was found in 9 (15.25%) followed by Hypertension in 8 (13.55%) employees. In administration Hypertension was leading morbid conditions found in 14(20.89%) of employees.

## DISCUSSION

Although many studies have been carried out on health hazards of thermal power plant workers in western countries, there is little research on this issue in India. The present study was carried out with the objective to estimate morbid conditions of thermal power plant employees. In the present study overall addiction to the tobacco, smoking and alcohol was found in 257 (64.25%) with tobacco consumption in 197 (49.25%), smoking in 101 (25.25%) and alcohol consumption in 62(15.50%) study subjects. Reason for higher tobacco consumption given by them was that

they have to work in the night. It helps them to be alert on job. Prevalence of tobacco consumption in employees was higher than that of general population. In General population the estimates of the Global Adult Tobacco Survey (GATS) conducted among persons 15 years of age or older during 2009–10 indicate that 34.6% of the adults (47.9% males and 20.3% females) are current tobacco users. Fourteen percent of the adults smoke (24.3% males and 2.9% females) and 25.9% use smokeless tobacco (32.9% males and 18.4% females) .<sup>3</sup>Prevalence of tobacco consumption was found to be 66.3% in the study done by Unalacak M et al<sup>4</sup> coal workers in turkey. Manna A et al<sup>5</sup> found 77% smoking status at coal handling workers from Kolkata.

In the present study 400 employees were examined for morbidities. They were included from various sections and different categories (workers, supervisors and office workers) of employees. The leading morbidity observed in the present study was respiratory morbidity i.e. 77 (19.25%) in overall employees among it chronic bronchitis was in 53(13.25%); and Bronchial asthma 14 (3.5%).In gastrointestinal system acid peptic disorder was present in 39 (9.75%) of employees. Musculoskeletal disorder was present in 51 (12.75%) of employees. Sensory neural hearing loss was present in the 9 (2.25%) of study subjects. Power plant workers may be at an elevated risk for inhaling the asbestos fibres, and many of these workers have developed an asbestos-related disease due to this exposure. Paunović EB et al<sup>6</sup> carried out study in the thermal power plant Nikola Tesla, Obrenovac, Yugoslavia for finding the occupational health effect. They studied 641 workers. The prevalence of the diseases was hearing loss 0.77, cardiovascular diseases 0.29, musculoskeletal disorders 0.17, and endocrine diseases 0.09. Manna A et al<sup>5</sup> carried out study in workers of coal handling plant in the thermal power plant. Major clinical findings of their study was respiratory morbidities (72%); abnormality of hairs (70%), pallor (58%); gastrointestinal disturbances (38%); high blood pressure (10%) somewhat comparable to present study. In the respiratory morbidity sore throat (60%) was most common followed by infective lung disease (14%).Raj B et al<sup>7</sup> studied 342 male workers from thermal power plant. In their study 135 (39%) workers were symptomatic for respiratory morbidity and 207(61%) were asymptomatic. Asymptomatic cases were diagnosed on the basis of Forced Vital Capacity (FVC), Forced Expiratory Volume in the first second (FEV<sub>1</sub> %). These were measured by Spirometry. Garkal KD et al<sup>8</sup> studied for pneumoconiosis in thermal power station in Parali in 121 coal handling plant workers. Out of them 71 (58.60%) were suffering from restrictive type of pulmonary impairment. 10 cases (8.20%) were found suffering from obstructive type and 4 (3.30%) were suffering from mixed blockage

Respiratory morbidity viz. chronic bronchitis and bronchial asthma was most common morbidity followed by hypertension, acid peptic disease and musculoskeletal discomfort were the next common health

problems reported by the employees. Power plant workers may be at an elevated risk for inhaling the asbestos fibres, and many of these workers have developed an asbestos-related disease due to this exposure. The presence of underlying respiratory diseases unrelated to occupational exposures cannot be excluded but the results of the reparable dust measurements and the long history of high level exposures are most likely directly related to occupational exposures. For employee working in a power plant, it is highly advised that they must have regular health checkups.

Limitations to the study was Spirometry measures the ratio of forced expiratory volume in first second to forced vital capacity (FEV<sub>1</sub> to FVC) which is the most sensitive and specific test for detecting early airflow limitations. So we were unable to detect the asymptomatic cases. So there may be chance of underestimating the prevalence of respiratory morbidity. Detailed evaluation with radiological and serological tests was necessary to find out the relationship between occupational exposures to inorganic pollutants to detect the possible morbidity associated with inhalation of inorganic dust.

So there is a need for motivation of study subjects, to leave the personal habits of smoking, smokeless tobacco and alcohol by giving regular health education. Periodic compulsory health check-up including pulmonary function tests should be done for early diagnosis of asymptomatic cases having respiratory morbidity like chronic bronchitis, COPD, asthma.

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