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Occupational Hazards and Stress among Coal Mine Workers : A Review

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ABSTRACT

Coal mining is acknowledged as a unsafe occupation that causes a great deal of physical and mental stress. The main causes of occupational stress among coal mine workers are investigated in this review paper. It focuses on how long work hours, job insecurity, and unsafe working conditions— such as exposure to dust, heat, noise, and hazardous. The review also emphasises the prevalence of psychological difficulties like stress, anxiety, and lower level of job satisfaction, as well as physical health concerns including respiratory conditions, hypertension, and other chronic diseases. The review emphasises the prevalence of psychological disorders like stress, anxiety, and low job satisfaction as well as physical health problems like respiratory ailments, hypertension, and other chronic conditions. It also looks at how mental pressure and an overwhelming workload can lower attention spans, which raises the risk of accidents and lowers productivity.

Keywords: Occupational stress, Physical health, Mental health, Work environment

INTRODUCTION

"Stress is nothing more than a socially acceptable form of mental illness". It is the mental and physical condition that results when the assets of an individual are inadequate to satisfy the demands of the job. Stress related to one's work is known as occupational stress (Karthikeyan and Lalwani, 2019).

One of the primary jobs in India is mining, which employs a sizable and possibly expanding workforce. Additionally to being able to perform physically exhausting job, miners have to cope with stress and contaminants from the environment such as dust, noise, heat, vibration, poor illumination, radiation, etc. (Nandi *et al.,* 2009). Occupational stress is stress related to one's job (Karthikeyan and Lalwani, 2019).

Research works consistently report increasing stress rate at the job place with various implications on the well-being of workers and productivity in all countries. Job stress negatively influences health and leads to economic loss in an organization. Stress levels are different in different countries. According to the works of Milczarek (2009), the stress rates for Germany were (16%); the UK (12%); Slovenia (38%); and Greece (55%). Various elements such as job characteristics, job-related attributes, and demographic features contribute to job stress. (Owusu *et al.*, 2021)

Stress is a weird disorder that humans are currently suffering from as a result of modern technological advancements, hectic schedules, cultural, political, and economic changes in society, and constantly changing roles, role ambiguity, and role conflicts. Selye used the word "stress" to define a range of psychological and physiological responses to adverse circumstances. Occupational stress, in the context of an organization, is the stress that a worker experiences at work. The negative emotional and physical responses that arise when the demands of the workplace do not align according to the workers' abilities, resources, or requirements can also be referred to as occupational stress (Suraksha and Chhikara, 2017).

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The most frequently observed organisational symptom, role stress, can be broadly classified as role uncertainty. Employees are more inclined to encounter role conflict when faced with competing goals or difficult duties. On the other hand, role ambiguity will arise from an ambiguous work role. If either of the two cases is not promptly resolved, employees will be under stress (Chen *et al.,* 2012).

Literature review means reading, understanding, and forming conclusions from previous studies, theories, and models related to a research topic (Sidhu, 2006).

This paper is divided into three parts. These three parts are as follows :

1. Impact of Demographic Variables on Stress.
2. Work-Related Stress.
3. Health Status of Coal Miners.

Impact of Demographic Variables on Stress:

Carlisle and Parker's (2014) Australian study investigated the connection between psychological distress, especially coal workers' reporting of pain, and demographic characteristics. It examined trends among miners of various ages, medical conditions, and occupations using survey data. Physical discomfort was more common among older workers, which worsened psychological distress. Younger workers, on the other hand, felt pressure due to professional development and job insecurity. Stress was substantially raised by long workdays and consecutive workdays without breaks, particularly for employees between the ages of 30 and 50. Stress levels were exacerbated even more by the higher incidence of unhealthy lifestyle choices (such as smoking and inactivity) among miners with low incomes or low levels of education. Compared to regular employees, supervisors and team leaders expressed feeling more stressed. They experienced emotional pressure as a result of juggling operational safety oversight with administrative duties. They emphasise that stress is multifaceted, with roots in lifestyle, age, and health as well as the demands of professional roles.

According to Pizarro and Fuenzalida (2021), employees with low levels of education often lack understanding of safety protocols, have fewer strategies for coping, and have few opportunities for career advancement, all of which increase job satisfaction. High levels of anxiety, depression, and stress are consistently predicted with low income. The impacts of physically difficult job are made worse by economic uncertainty, especially when wages aren't considered to be commensurate with effort. In general, married employees report less psychological distress. It seems that family support operates as a buffer from the adverse consequences of stress and professional dangers. Age groups exhibit distinct stress profiles. While older workers have physical strain and chronic health issues, younger workers struggle with anxiety about the future and a lack of expertise. Whenever they are present, female coal miners face specific challenges such family obligations, inadequate facilities, and gender discrimination, all of which increase stress levels. Higher levels of stress are associated with supervisory positions and irregular shift work because of the expectations of leadership, the administrative burden, and the lack of a healthy work-life balance.

According to Hao *et al.* (2025), miners with a history of occupational illnesses or safety incidents had greater levels of depression and anxiety. Stress levels were higher among workers who slept under seven hours a night, and younger workers and shift workers were prone to have poor sleep. Poor mental health was linked to regular alcohol drinking, which was more common among middle-aged and single workers. It's interesting to note that workers in management roles reported higher levels of anxiety, probably as a result of extended working hours and pressure to fulfil obligations.

Work-Related Stress:

Conflict between jobs and families is a significant cause of stress for employees because it sets off the balance between professional and personal responsibilities, according to Anderson *et al.* (2002), a study done in the United States. Reduced job satisfaction, emotional fatigue, and reduced efficiency might result from this imbalance. Stress at work has an adverse effect on both individual well-being and performance in the workplace.

The prevalence of issues with sleep was about 30%. This is incredibly high because 38% of workers reported being sedentary and 48.3% of workers indicated frequently smoking. 69.5% of employees reported being overweight, over 60% stated that they felt exhausted, 45.2% indicated abnormal oximetry measurements, and 89.2% reported having a sleep disturbance of some kind (Vera and Contreras, 2008).

The chance of having symptoms of depression was higher (79%) among workers with inadequate social

support. 78% of employees with an effort-reward imbalance were 78% more likely to exhibit depression symptoms. 83% of workers with rigorous requirements were more likely to show symptoms of depression. The probability of having depressive symptoms was 4.5 times higher among those who were under a lot of stress (Ansoleaga and Toro, 2010).

According to Soni *et al.* (2015), high levels of workplace stress have a detrimental impact on employee health, wellbeing, and morale as well as to their quality, productivity, and creativity. As a result, it's critical recognise and handle with work-related stress as soon as it is possible.

The findings of Tiwari *et al.* (2015) revealed a direct relationship among organisational commitment, health, and work stress. Organisational commitment was found to be negatively linked with work stress. More specifically, it was found that affective, normative, and overall commitment were adversely correlated with objective work stress, feelings of interpersonal work stress, and job interest. Affective, normative, and overall commitment had an inverse correlation with physical condition. In addition, certain aspects of organisational commitment were found to be negatively correlated with both physical and psychological sickness. Affective commitment was found to be most negatively explained by stress linked to physical condition and interpersonal job stress, according to regression results.

Emmanuel and Collins (2016), The majority of employees were found to have been both moderately and significantly stressed, with female employees expressing higher levels of occupational stress than their male counterparts. The study also showed that there is evidence of a significant connection between demographic factors (gender, age, education, experience, and marital status) and occupational stress.

According to Suraksha and Chhikara's (2017) structural equation modelling, every element related to occupational stress is significant. But the most significant factor shows revealed to be a role overload. The findings show that overall occupational stress is the most significant of all the variables investigated, accounting for 87.2 per cent of the variation in this factor.

As per Das (2018), an array of factors influence work stress in the coal mining industry, including more working hours, inadequate compensation, a lack of opportunities for career growth, an excessive workload, working conditions that significantly impact workers' productivity and efficiency. Stress at work leads to higher employee turnover, dissatisfaction and a lack of dedication to the task, which limits banks' expansion and prosperity. In a time when the globe is very dynamic, employees are exposed to a wide range of stressors that could have an impact on him in all facets of his life.

Yong *et al.* (2020), fthere was a positive correlation between job burnout and job stress, which was also connected to depression. While years of employment and burnout were directly associated with depression, multivariable linear regression analysis demonstrated that depression, sex, and occupational stress were independent predictors of job burnout. Overall, the outcomes point to the negative impacts of occupational stress on both mental and physical health by demonstrating that it is strongly related to increased job burnout, depressive symptoms, and hypertension.

Health Status of Coal Miners:

Donoghue (2004) - As a source of essential components and jobs, mining continues to be vital to the advancement of global industry. While significant improvements have been made in managing occupational health risks - such as better safety equipment and dust control - miners still face hazards like respiratory and musculoskeletal issues. To further minimise dangers and protect employees, more stringent regulations, ongoing innovation, and health monitoring are required.

Nandi *et al.* (2009), found in their research, only 42% of miners are literate. In both miners and controls, smokers had far more severe pulmonary restrictive impairment compared to nonsmokers. The common ailments amongst miners were musculoskeletal morbidity (8%), diabetes (8.8%), and hypertension (22.6%).

As per studies by Singh and Ghosh (2012), there were approximately 10,000 non-fatal injuries in Indian coal mines between 2001 and 2010 (DGMS Report, 2011) and a high incidence of serious and unintentional occupational injuries. The psychological effects of safety risk are rarely acknowledged, notwithstanding the fact that physical injuries from falling objects, standard equipment, or explosions tend to be reported and documented. Coal miners frequently suffer long hours, uncomfortable working conditions, and constant stress.

The coal mining industry has a significantly inadequate safety culture than the other industries, based on this study that evaluates the worldwide pattern of safety in the mining sector. Further investigation is needed

to develop safer regulations and risk mitigation techniques. (Sheng and Wen-biao, 2012)

Azad *et al.* (2013), reported that fine particles of dust enter the nasal cavity and upper respiratory system, travel deep into the lungs, and remain there for a longer amount of time since the cilia and mucus are unable to remove them. Larger diameter particles get stuck in the upper respiratory system, where they irritate the throat and lungs, leading to asthma-like symptoms, such as wheezing, and sinus infections. Coal's high mercury level decreases hormone production, which leads to early ageing, stress, diminished sex drive, worsening menopausal symptoms, and a fall in male fertility.

According to Rokhim *et al.* (2018), coal has an adverse impact on the environment via most significant cause of carbon dioxide emissions. Furthermore, in order to establish new coal mining locations, Deforestation is a requirement for coal miners. According to this study, locals' health is affected by who live close to the coal extraction site are at risk for health issues. In addition, there is also potential confrontations with locals. Additionally, the trade balance is adversely affected by coal mining. exchange rate, as well as the development of other industries, particularly when commodity prices decrease.

According to Neelakanti and Sriramula (2019), miners of coal are among the unique categories that work harder than other workers. 56.74% of workers were in the 50–60 age range, resulting in individuals more susceptible to physical risks. 89.37% of workers had more than 20 years of work experience, were chronically exposed to coal dust for more than 20 years, and were more likely to develop chronic diseases. Smokers makeup 26.03% of coal mine workers, drinkers make up 68.08%, and smokeless tobacco addicts make up 6.37%. In the current study, the prevalence of diabetes and hypertension was 16.31% and 19.15%, respectively, whereas the prevalence of peptic ulcers and signs of chronic respiratory diseases among coal mine workers was 2.84% and 28.38%, respectively. Morbidity is higher than in the general population.

Li *et al.* (2019), reported that the degree of occupational stress, monthly salary, and level of education all have an effect on the quality of life of copper-nickel miners. Poorer quality of life was found to be related to older age, lower income, greater educational attainment, and higher levels of occupational stress. Occupational stress is a risk factor that can lower quality of life, and copper-nickel miners experience substantial quantities of it.

Conclusion :

One of the most hazardous and most stressful professions is coal mining. Studies indicate that due to the nature of their jobs, coal miners suffer significant levels of both physical and psychological stress. They must labour in open or underground mines, where the conditions tend to be hazardous, uncomfortable, and taxing. The demanding workplace is one of the main sources of stress. Coal dust, high temperatures, loud noises, and inadequate ventilation are all constant hazards for miners. In addition to physical exhaustion, this can result in major health issues such lung conditions, chronic illnesses, and respiratory ailments.

Persistent exposure to these situations raises mental and physical stress. Long hours at work and a substantial workload are other significant factors. Many miners put in long shifts with little time off, which causes fatigue and burnout. In addition, there is ongoing pressure to reach production goals, which exacerbates mental stress. Fatigue may trigger workers to lose focus, which increases the possibility of mishaps and injury in mines. Indian coal workers experience psychological and emotional strain as well. They frequently deal with strain on finances, job insecurity, and fear of accidents. Employees are frequently recruited on a contractual basis, which raises questions about their future. Anxiety, depression, frustration, and low job satisfaction result from this. Long workdays also interfere with their family life, leading to emotional stress and an imbalance between work and life.

Coal workers frequently suffer from health issues. Research reveals that they exhibit high rates of mental health problems, diabetes, hypertension, and sleep disorders. Their condition is made worse by insufficient medical care and knowledge. Inadequate management of mental stress may also decrease productivity at work.

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