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Occupational Health and Safety Practices among Stone Crushing and Quarrying Workers: A Cross-Sectional Study from Poonch District of J&K India

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Abstract
Occupational health is one of the unheeded public health concerns throughout the developing nations. Present study was conducted in the Poonch district of J&K, India, to assess the status of occupational health and safety practices among the workers engaged in the stone-crushing and quarrying sector. To obtain data, a questionnaire survey was conducted among 160 workers randomly selected from the stone-crushing units operating in the area. Regardless of age or work experience, the survey found that the majority of the workers suffer from a wide range of occupational health concerns, with respiratory ailments (74.38%) accounting for the majority of these followed by skin-related issues (63.75%), hearing problems (61.25%), headaches (52.5%), chest pain (44.38%), eye problems (41.25%), backache, fatigue (40%), and minor injuries (8.75%) respectively. Poor working conditions and the practice of not wearing safety devices during working hours are likely to be the causes of these health issues. Moreover, there was a lack of appropriate PPEs to protect employees at various working sites. The study recommended that appropriate health care and safety measures must be developed and implemented in this sector along with training for workers to minimize occupational hazards during working hours.

Keywords: Stone crushing units; Workers; Occupational health; Hazardous; Problems

Introduction

Occupational health and safety typically refer to the material and approaches that are unlikely to cause harm to workers. Every occupation has some threats or hazards that may cause an individual to develop certain illnesses or injuries, suddenly or over the years. In broad terms, occupational health hazard denotes a risk or danger resulting from the nature or working conditions of a specific work (Danna and Griffin, 1999).

Occupational health hazards have been identified as one the primary sources of potential injury in the form of workplace accidents, injuries, illnesses, disabilities, and deaths caused by inadequate working conditions (Deng et al., 2020). According to the International Labor Organization (ILO), every year, on average 374 million personnel globally suffer from occupational hazards, with 2.78 million dying as a result of occupational accidents and work-related diseases (ILO, 2013). Stone crushing and quarrying is one type of such industrial sector nearly found in all the major cities or towns throughout the world. It is known to be one of the most hazardous industrial sectors due to the greater number of hazardous activities involved and a very less steady workforce. Despite being socioeconomically a vital sector, it remains a tough workplace that poses serious dangers to the

occupational health and safety of workers and the surrounding people (Semban and Chandrasekhar, 2000; Prasad, 2017; Gupta A, 2019). Stone crushing and other related activities have a significant impact on the air, water, land, and biological resources, as well as the socioeconomic status of the surrounding community. Noise and dust from stone-crushing and quarrying sites endanger workers' occupational health and safety.

The noise produced by the stone crushing and quarrying activities is a severe form of pollution and is regarded as one of the primary sources of annoyance for humans because it has direct and cumulative negative effects such as hearing loss, stress, cardiovascular disease, high blood pressure, insomnia, and depression (WHO 2012; Paneto et al., 2017; Alves et al., 2018; Swades and Indrajit, 2021; Bashir and Manzoor, 2022). Stone dust is a primary aerosol that contributes significantly to air pollution, and its severity depends upon several factors specific to the local place and microclimatic conditions (Mathur and Choudhary 1996; Tribhuwan and Patil 2009; Manzoor and Khan, 2020). It causes damage to people and the environment, including flora and fauna. Long-term exposure to stone dust causes silicosis/pneumoconiosis, which is associated with shortness of breath, chronic bronchitis, recurring chest infections, and heart failure (Zenz et al. 1994; Scott and Grayson, 2003; Singh and Pal, 2010; Sheikh et al, 2011). Many studies have found a significant link between dust and a variety of cardiovascular and respiratory health complications, including mortality, hospital visits, respiratory illness, physiological changes in pulmonary functions, and so on (Sivacoumar et al., 2001; Semple et al., 2008; Narkhede et al., 2012). Occupational health is an important aspect of working conditions. The present study was conducted in the Poonch district of Jammu and Kashmir, India, to assess the status of occupational health and safety practices among the workers engaged in the stone-crushing and quarrying sector.

Material and Methods

Study Area

Poonch is one of the remote districts of Jammu and Kashmir, India, situated at the foothills of the Pir Panjal range in the Western Himalayas, with an average elevation of 981 meters above sea level. Geographically, it is located between longitudes 33.77° N and 74.1° E (Fig: 1). The climate of the area spans from subtropical to temperate, with temperatures ranging from 20-39 °C in summer to 3-19 °C in winter. Topographically Poonch is steep, hilly, and undulating, with a few plain valleys watered by small rivulets and nallahs. The region had an annual rainfall of 929.2mm. Poonch district has a population of 476,835, with 91.89 percent of the population being rural and 8.10 percent urban. Poonch district is rapidly urbanizing, with numerous construction projects underway. The current study attempts to analyze the occupational health of personnel working in various stone-crushing and quarrying units operating in the area.

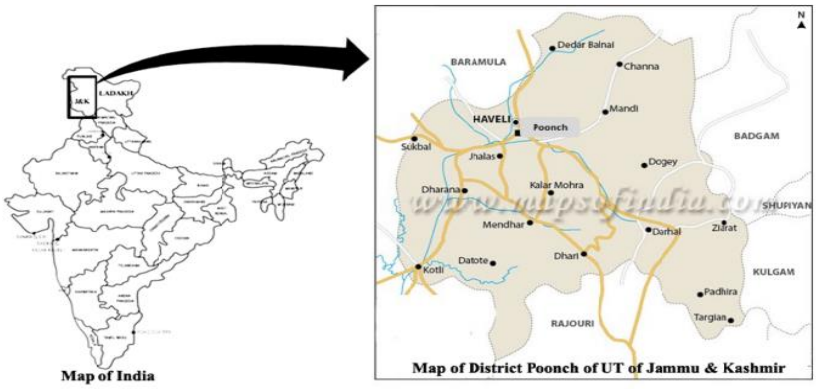

Fig. 1. Map of the study area

Methodology

A descriptive cross-sectional study was conducted from July to September 2024 on a randomly selected sample of 160 full-time workers who were directly involved in the stone crushing and quarrying process in the area. The study used both primary and secondary data. To obtain primary data, a standardized questionnaire with open and closed-ended questions was designed and used to interview employees.

This questionnaire was designed to capture three categories of data: (a) respondents' socio-demographic information (b) occupational injury and health attribute information, and (c)

respondents' knowledge on safety practices and personal hygiene. The acquired data was tabulated and analyzed with simple statistical tools, and therefore the findings have been computed.

Result and Discussion

Socio-demographic profile of the respondents

Table 1 describes the respondents' socio-demographic characteristics. Workers were divided into three age groups: 15-30, 31-45, and 46-60 years. It was found that 43.75% of the workers were between the ages of 31 and 45, 30% were between the ages of 45 and 60, and 26.75% were between the ages of 15 and 30 respectively. Moreover, the susceptibility and risk of the adverse health impacts of air pollution increases with age (Sacks et al., 2011). According to the survey, 55% of respondents were not married.

Table 1: Socio-demographic profile of the respondents (n=160)

Variable	Criteria	No.	Percentage
Age Range	15-30	42	26.25 %
	31-45	70	43.75 %
	46-60	48	30 %
Marital status	Married	72	45 %
	Unmarried	91	55 %
Educational status	Literate	62	38.75 %
	Illiterate	98	61.25 %
Family Income	<5000	30	18.75 %
	5000-10000	82	51.25 %
	10000 and above	48	30 %
Duration of work in the crushing units	< 5 years	97	60.62 %
	5-10 years	44	27.5 %
	>10 years	19	11.88 %
Routine working hours	6-8 hours	56	35 %
	9-12 hours	77	48.12 %
	>12 hours	27	16.88 %
Family Size (Member per family)	<4	24	15 %
	5	98	61.25 %
	6	38	23.75 %

Source: Primary/Survey data

The findings revealed that 61.25% of respondents had no formal education, while 38.75% had various levels of education, including primary, middle, matric, and intermediate. The majority of workers (51.25%) had family incomes ranging from ₹5000 to ₹10000/month, 30% had incomes beyond ₹10000/month, and 18.75% had incomes below ₹5000/month. 60.68% of the respondents had been working for less than 5 years, 27.5% for the previous 5-10 years, and 11.88% for more than 10 years. In terms of working hours, the majority of the respondents (48.12%) worked for 9 to 12 hours per day, 35% worked for 6 to 8 hours whereas 16.88% worked beyond 12 hours per day respectively. 61.25% of the respondents had a family size of five members, 23.75% had a family size of six members, and 15% had a family size of less than four members.

Issues regarding workers' occupational health and injuries

The stone-crushing and quarrying industries are regarded as one of the most perilous sectors in the world due to the iterative nature of the work and activities involved. Stone crushing generates serious environmental concerns during active mining and at crushing sites, posing ongoing occupational dangers to workers' lives and the surrounding populations. Table 2 highlights the health-related issues among the respondents with multiple responses. Workers were subjected to significant dust and noise exposure, which may result in the occurrence of numerous occupational ailments with time. According to the survey, regardless of age or work experience, the majority of workers suffered from a variety of occupational health issues, the most common of which were respiratory illnesses, skin issues, hearing problems, headaches, tinnitus, chest pain, eye problems, fatigue, backaches, and minor injuries.

The vast majority of the participants suffered from hypertension. According to the findings of the health survey, it was found that 74.38% of respondents were suffering from breathing problems, 63.75% reported skin irritation and dermatitis, 61.25% were suffering from some sort of hearing problems, 52.5% were suffering from continuous headache, and 47.5% had a cough like symptoms. 46.25% of respondents were reported to suffer from Tinnitus, a significant medical problem with no

cure (Mazurek et al., 2010). 44.38% of the respondents reported chest pain, 41.25% eye irritation, 40% fatigue-like manifestations, and 8.75% minor injuries. Moreover general infections, skin allergies, dermatitis, and the majority of respiratory issues among the workers were directly associated with silica-laden dust exposure (Ilyas and Farooq, 2010; Iftikhar et al., 2009; Nwibo and Ugwuja, 2012; Sivacoumar et al., 2006).

Table 2. Health-related issues among the respondents (n=160) multiple responses

Variables	No.	Percentage
Breathing problems	119	74.38 %
Skin irritation and Dermatitis	102	63.75 %
Hearing problems	98	61.25 %
Headache	84	52.5 %
Cough	76	47.5 %
Tinnitus	74	46.25 %
Chest pain	71	44.38 %
Eye irritation	66	41.25 %
Fatigue	64	40 %
Injury	14	8.75 %

Source: Primary/Survey data

Responses regarding the availability and use of safety measures

It has been noted that workers in stone-crushing establishments have experienced diverse health issues. The promotion and protection of safe work and working conditions are integral components of an industrial development setup (Upadhyaya, 2002). According to the survey, 68% of the participants have knowledge about different types of occupational hazards (Figure 1).

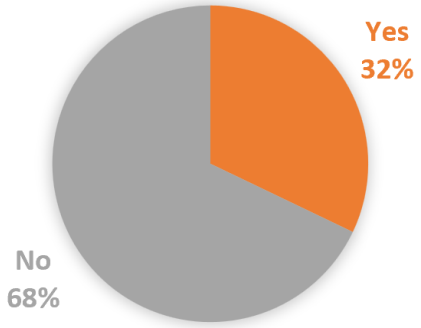

Fig. 2. Respondents' knowledge about occupational hazards

Table 3. Responses regarding the availability and usage of safety measures (n = 160)

Variables	Yes	No
Knowledge of personal protective equipment used during work hours	73.9 %	26.1 %
Should we wear personal protective equipment during work	66.6 %	33.4 %
Provision of PPEs at the workplace	15 %	85 %
Use of proper mask	18 %	82 %
Use of earplugs/muffs	12 %	88 %
Use of boots, helmets, face shields, and sunglasses during the work	5 %	95 %
Frequent washing of eyes with water	8 %	92 %
Washing of hands with soap and water before food	60 %	40 %
Relaxing and respiratory exercises	20 %	80 %

Source: Primary/Survey data

The results of the responses regarding the availability and usage of safety practices and personal hygiene (Table 3) among the workers revealed that 73.9% of the respondents were aware of various equipments to be used during working hours to avoid occupational hazards and injuries. 66.6% of the respondents were in favor of using various safety measures at work. Data analysis revealed that the provision of different personal protective equipments was less than 15% in all the stone-crushing units operational in the area. 18% of the respondents wear face masks during working hours, 12% use ear plugs/muffs to avoid excessive noise, 5% of the respondents use boots, helmets, face shields, and sunglasses, 8% were reported to use water for frequent eye washing while 6% of the workers wash their hands with soap before eating. 20% of the respondents were found to practice respiratory exercises to overcome fatigue and mental stress.

During the study, it was found that maximum of the stone-crushing units lacked basic first-aid facilities. It was also noticed that the basic facilities of toilets and clean drinking water are also missing in many of the units operating in the area.

Conclusion

The goal of occupational health should always be to promote and maintain the highest level of physical, mental, and social well-being of workers in all occupations to prevent all types of health hazards. The study concludes that the occurrences of occupational health issues were found to be inevitable in this industrial sector. Regardless of age or work experience, the survey found that the majority of the workers suffer from a wide range of occupational health concerns, with respiratory ailments (74.38%) accounting for the majority of these followed by skin-related issues (63.75%), hearing problems (61.25%), headaches (52.5%), chest pain (44.38%), eye problems (41.25%), backache, fatigue (40%), and minor injuries (8.75%) respectively. Poor working conditions and lack of safety equipment are the most likely causes of these health issues. Moreover, there was also a lack of provision of proper PPEs for the safety of workers at potential working sites.

Recommendations

It is recommended that there is primary need for the development and implementation of proper health care and safety guidelines. The workers must be provided with proper PPEs including helmets, glasses, breathing filters, etc. depending upon the nature of duty. The workers must be oriented about the possible health hazards, precautionary measures, and the importance of PPEs, for personal protection. Medical, transportation and other facilities should be offered along with wages to reduce economic constraints and enhance the quality of life.

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