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Research Article

Regarding Silicosis

Assessment of the Knowledge Regarding Silicosis among the Workers of Stone Cutting and Art Industrial Area Sikandra, Dausa, Rajasthan, With a View to Developing an Information Booklet

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Introduction: Silicosis is an incurable occupational lung disease resulting from prolonged inhalation of crystalline silica dust, primarily affecting workers in the stone cutting and stone art industries. Despite its severe health implications, knowledge regarding silicosis among workers remains limited, leading to increased morbidity and mortality.

Materials and Methods: A descriptive design within a quantitative research approach was employed for this study. Data was collected using a structured interview schedule to evaluate workers' knowledge about Silicosis. A cluster sampling method was employed to select 100 workers from the Stone Cutting and Art Industrial area of Sikandra, Dausa, Rajasthan. The structured knowledge interview schedule gathered both Background details and knowledge-related questions about Silicosis. The collected data were organised, analyzed, and interpreted utilizing descriptive statistics.

Results: The results revealed that 62% of participants had average knowledge, 35% had good knowledge, and 3% had poor knowledge regarding Silicosis. The mean score was 18.28, with a standard deviation of 3.9. The overall average knowledge score stood at (score 11 to 20) 33.33% to 66.66%. A statistically significant relationship was identified between knowledge and the workers' education and monthly income ($p < 0.05$), while no association was observed with other demographic factors such as age, work experience, and sources of information.

Conclusion: The study highlights the need for enhanced education and awareness programs to improve workers' knowledge of silicosis. Based on the findings, an information booklet was developed to promote health education and preventive measures. The study emphasizes the importance of workplace interventions, regular health check-ups, and policy implementation to mitigate the risks of silicosis.

Keywords: Silicosis, Stone Cutting Workers, Knowledge Assessment

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Introduction

Silicosis is an occupational lung disease prevalent among miners as well as workers in manufacturing and construction industries. Inhalation and deposition of silica dust particles result in persistent inflammation along with granuloma formation and fibrosis of lung tissues, resulting in reduction of functional capacity of lungs [1].

In both developing and developed countries, one of the oldest occupational diseases still possesses a high morbidity and mortality rate globally. Silica exists in both crystalline and amorphous forms. Quartz is a common form of crystalline silica and is the most common mineral of the Earth's crust. Respirable silica mainly consists of Crystalline silica particles with a diameter of less than 10 microns, which can easily become airborne and are readily deposited in the respiratory tract [2].

In 1995, the World Health Organisation (WHO) and the International Labour Organisation (ILO) launched a global awareness and prevention campaign aiming to eliminate silicosis by 2030. Several countries have since implemented national programmes to support this goal. However, in many low- and middle-income countries, including India, silicosis remains a significant occupational health challenge. India has a large mining industry [3].

Objective of the study

To assess the knowledge regarding Silicosis among the Workers of the Stone Cutting and Art Industrial area of Sikandra, Dausa, Rajasthan.

To find out the association between knowledge regarding Silicosis among the workers of the Stone Cutting and Art Industrial area with their selected Background variables.

To develop an Information Booklet regarding silicosis for workers.

Need for the study

In 2019, around 2.65 million silicosis cases were reported worldwide, causing over 12,900 deaths and 650,000 DALYs [4]. Despite preventive measures, it remains common in many countries. The WHO and ILO launched a global campaign in 1995 to eliminate silicosis by 2030. In Europe, over 5 million workers were exposed to silica dust in 2006, especially in construction.

In the U.S., 2.3 million workers face exposure, and although deaths declined by 53% from 1999 to 2018, new cases continue. China reported over 23 million exposed workers, with silicosis making up 35% of all occupational diseases in 2013. Brazil and South Africa also report high rates among mining workers [5]. In India, 11.5 million workers were exposed in 2015–16, expected to rise to 52 million by 2025–26 [4]. Prevalence varies: 3.5% in ordnance factories (Delhi), 25–55% in slate pencil units (Madhya Pradesh), and 30% in flour mills (Mumbai). Gujarat and Rajasthan show high rates among agate, pottery, and stone workers. Silico-tuberculosis is also common in these groups [4]. A 2024 report from *Rajasthan Patrika* highlighted over 2,000 registered silicosis cases in Dausa district, with more than 400 deaths and many still awaiting government aid [6].

Rajasthan introduced a pneumoconiosis policy in 2019. Out of 192,143 people screened, 23,436 silicosis cases were found—12% prevalence among stone workers. Despite covering only 0.5% of India's land, Rajasthan has the highest number of mining leases [4]. The stone mining sector is marked by male dominance, low literacy, long working hours, and economic pressures forcing people into hazardous work. As my personal experience during clinical posting at the government. In the radiology department of the district hospital, Dausa, I have observed that patients who are working in stone cutting and art industries come to check up and follow up in OPD These patients have very poor awareness regarding Silicosis and its prevention and the importance of personal protection at the workplace. So I chose the silicosis topic related to workers who work in the stone cutting and art industries, Sikandra, Dausa, to assess the knowledge of workers about Silicosis.

Hypothesis:

H1: There will be a significant association between knowledge regarding Silicosis among the workers of the Stone Cutting and Art Industrial area with their selected Background variables at the 0.05 level of significance.

H01: There will be no significant association between knowledge regarding Silicosis among workers of the stone cutting and Art industrial area with their selected Background variables at the 0.05 level of significance.

Methodology

Materials and Methods

1. Setting

The study was conducted in Sikandra, Dausa District, Rajasthan, a region recognised for its stone cutting and art work industries, where occupational exposure to silica dust is highly prevalent.

2. Duration and Type of Study

This was descriptive non-experimental study carried out over a duration of 7-12-2024 to 17-12-2024.

3. Sampling Methods

A **cluster sampling technique** was employed to select participants from the list of registered stone cutting and art workers in the area, ensuring fair representation across different age groups, educational backgrounds, and work experience levels.

4. Sample Size Calculation

A cluster sampling technique was used for this study. The total population was divided into clusters (zones) and further subdivided into subzones (A, B, C, etc.). The population consisted of 2,500 workers, which was divided into 10 clusters. Each cluster had an average population of 250 workers.

Within each cluster, simple random sampling was applied to select 10 workers from each cluster, resulting in a total sample size of 100 workers (10 workers × 10 clusters = 100 workers).

According to the WHO guidelines for sample size determination, for a population of 2,500, a sample size of 100 is more than sufficient and is considered statistically acceptable and representative.

5. Inclusion Criteria

- Workers actively engaged in stone cutting and art-related work in Sikandra.
- Workers are willing to provide informed consent and participate voluntarily.
- Workers who were able to understand the Hindi language.

6. Exclusion Criteria

- Workers diagnosed with respiratory illnesses unrelated to occupational exposure.
- Workers are not willing to participate in the study or provide consent.

7. Data Collection Procedure

- Participants were briefed on the purpose of the study.
- Written informed consent was obtained from each participant.
- Data was collected through face-to-face interviews using a pre-tested structured questionnaire, allowing participation of individuals irrespective of literacy level.
- The data collection process was conducted over 10 days to minimise disruption to the participants' work.
- Permission was taken from the local administrative authorities of the Sikandra region (CM&HO), Dausa.

8. Scoring System

The knowledge questionnaire consisted of 30 closed-ended questions related to silicosis awareness, causes, preventive measures, and management:

- Correct answer: 1 point
- Incorrect or “Don’t know” answer: 0 points

The total score ranged from **0 to 30** and was categorised as:

- Poor Knowledge: 0–10
- Average Knowledge: 11–20
- Good Knowledge: 21–30

9. Ethical Considerations and Permissions

- Approval for the study was obtained from the Institutional Ethics Committee (Principal of Government College of Nursing, Jaipur, Rajasthan).
- Permission was taken from the **local administrative authorities** of the Sikandra region (CM&HO), Dausa.
- Written informed consent was obtained from all the participants of the study.
- Participants were assured of **confidentiality and anonymity**.
- Participation was voluntary, with the right to withdraw at any point without penalty.

10. Statistical Analysis

Data was entered into Microsoft Excel and analysed using SPSS version 25.0.

- Descriptive statistics such as frequency, percentage, mean, and standard deviation summarised demographic data and knowledge scores.
- Chi-square test was used to determine associations between demographic variables (e.g., education level, income) and knowledge levels, with significance considered at $p < 0.05$.

11. Additional Notes

- Pilot testing of the questionnaire was conducted with 30 workers to ensure clarity and reliability.
- As the study was non-interventional, obtaining ethical permission from the ethics committee was not mandatory.
- Expert validation ensured the content validity of the data collection tool.
- Strict COVID-19 safety protocols (mask use and physical distancing) were followed during data collection.

Result

Table No. 1: Distribution of knowledge scores on Silicosis among workers of Stone Cutting and Art Industrial area of Sikandra, Dausa, Rajasthan, presented by frequency and percentage (N=100)

Level of knowledge	Frequency(f)	Percentage (%)
Good	35	35%
Average	62	62%
Poor	3	3%

Table 1 illustrates that a majority of workers(62%) had average knowledge about Silicosis, while 35% reported good knowledge, and only 3% had poor knowledge.

Findings

The results revealed that 62% of participants had average knowledge, 35% had good knowledge, and 3% had poor knowledge regarding Silicosis. The mean score was 18.28, median 19, mode 20, with a standard deviation of 3.9. According to the findings of this study, the mean, mode, and median values are very close to each other, and the standard deviation is low, indicating homogeneity in data."

The overall average knowledge score stood at (score 11 to 20) 33.33% to 66.66% A statistically significant relationship was identified between knowledge and the workers' education and monthly income ($p < 0.05$), while no association was observed with other demographic factors such as age, work experience, and sources of information

Association with Background Variables

A statistically significant association was found between workers' education and monthly income ($p < 0.05$), while no association was observed with other demographic factors such as age, work experience, and sources of information. These findings suggest that a worker's education status and monthly income have an impact on the level of knowledge regarding silicosis. Therefore, the research hypothesis was accepted, and the null hypothesis ($H0_1$) was rejected.

Discussion

Findings of the present study regarding Silicosis among workers revealed that the mean score of knowledge was 18.28, and the standard deviation was 3.9. It was also revealed that 62% of workers had average knowledge, 35% had good knowledge, and 3% had poor knowledge.

The findings of the present study are contradicted by a study by **Dixit Ramakant et.al.** A descriptive cross-sectional study was conducted to assess the Socio-demographic profile, work practices, and disease awareness among stone mine workers having Silicosis from Central Rajasthan. The result shows that 81.9% of % mine workers were illiterate. A varying duration of work exposure was observed, with more than 10 years in 63.4% and more than 20 years in 32.2% workers. 80.9% subjects were not aware of the term silicosis, and more than 80% were not aware of the symptoms and causes of silicosis. Only one-fifth, 20% subjects had awareness. Of using protection against the disease. Overall awareness about silicosis was better among literate and younger participants.[7]

The findings of the present study are supported by a study by **Khan Parvej.** A Quantitative descriptive survey study was conducted to assess the awareness regarding silicosis and its prevention among quarry workers at Jodhpur. The study concluded that the majority (52%) of samples were aware of silicosis &its prevention.

Insignificant association between the awareness of samples with selected socio-demographic variables like Gender, Marital status, Religion, Household income, Type of work, Working experience in mines, Working hours per day, except Age, and Educational status. According to the Educational status of the samples, more educated workers are more aware of silicosis and its prevention than less educated workers.[8]

The study findings revealed that there was a statistically significant association between the knowledge regarding Silicosis and background variables of education status and age, and no significant association between knowledge and other background variables (Gender, Marital status, Religion, Household income, Type of work, work experience and source of information) The findings of present study are contradicted by a study by **Chowdhary Pradeep K and Dr. Tara Chand Chaudhary,** A study was conducted in selected stone industries in Bharatpur The findings of the study revealed that there was The study also revealed that, there was significant association between pretest knowledge and gender. There was no significant association between pretest knowledge and other variables such as age, marital status, education, years of experience, working section and pretest knowledge score regarding Silicosis.[9]

The study findings revealed that there was a statistically significant association between the knowledge regarding Silicosis and background variables of gender, and no significant association between knowledge and other background variables (age, marital status, education, and years of experience, working section) The findings of the present study are supported by a study by **Nandi Subroto et al.,** who conducted a study to assess Silicosis awareness and knowledge among stone mine workers 52.46% were from Jodhpur, and 47.54% belonged to Nagaur district, Rajasthan. The results of the study revealed that education or literacy highly affects the knowledge about Silicosis among stone mine workers. The awareness index was found to be significant for the alertness of silicosis in contrast to regions, age groups, and the habit of two regions and was significant for literacy in two regions. [1]

Study findings revealed that there was statistically significant association between knowledge regarding Silicosis & background variables of education, And no significant association between knowledge and other background variables (age groups, and habit)

The findings of the present study are supported by a study by **Shrivastava Ashish et.al** A cross-sectional study was conducted on the marble cutting workers of Bhedaghat Jabalpur district. The study result reveals that utilisation of preventive measures was very poor, only 5%, but after the 2 follow-up visits, including interventional measures and health education, the percentage of workers who started using preventive measures increased from 5% to 57.77%. [10]

The findings of the present study are supported by a study by **Rawat Richa.** A study was conducted to determine how well-informed stone mine workers were about silicosis from Beawar, Masuda, Nasirabad and Kishangarh tehsils. Positive response to knowledge was given by 68.98% workers, 13.72% were not able to decide, and 17.29% were not aware of health issues related to the respiratory system. 77 workers (41.17%) were aware of the health care facilities available for mining and pulverising industry workers, 67 (35.83 %) were not able to say, but 43 (22.99%) were completely unaware. Social benefit scheme for silicosis workers in which the government provide Rs. 1 lakh for certified patients and Rs. 3 lakhs to deceased workers was known to 51.87% workers; however, 22.99% workers were completely unaware of the scheme.[11]

The study concluded that the awareness of silicosis among mine workers was significantly influenced by their degree of education. Additionally, illiteracy and a lack of understanding of how to apply preventative measures might have a negative effect. The findings suggest a critical gap in knowledge among a majority of the workers, emphasising the need for structured educational programs. The significant impact of education and income on knowledge levels suggests that targeted interventions for less educated and low-income groups could be particularly effective. Given that workers acquire limited information from existing sources, protective measures, including the distribution of information booklets and community health awareness campaigns, are imperative.

Implication Implementation of mandatory health education sessions at industrial sites.. Explore innovative,

Cost-effective methods to enhance awareness about occupational diseases among low-income groups.

Recommendations

Regular health check-ups and dust exposure monitoring. The workshop and seminar may be conducted to enhance knowledge regarding Silicosis. A similar study can be conducted on a larger and wider sample in order to draw a generalization. A comparative study may be conducted between the urban and rural workers.

Conclusion

This study highlights the limited knowledge and awareness of silicosis among stone cutting and art workers in Sikandra, Dausa, Rajasthan. Despite working in environments with high exposure to crystalline silica dust, a significant proportion of workers demonstrated poor to average levels of knowledge regarding the causes, prevention, and health risks associated with silicosis. The findings also revealed a significant association between education level, monthly income, and knowledge scores, indicating that socio-economic and educational factors critically influence occupational health awareness.

The lack of awareness observed in this study underscores the urgent need for targeted health education programs and training sessions aimed at workers in the stone cutting industry. Such interventions should focus on preventive measures, including the use of personal protective equipment, engineering controls to minimise dust exposure, and periodic health check-ups to detect early symptoms. Moreover, collaborative efforts by government agencies, employers, and local health authorities are essential to strengthen the enforcement of occupational health and safety regulations.

The results further emphasise the importance of integrating occupational health literacy programs into community health initiatives. Tailored educational campaigns, delivered in the local language and supported by visual aids, can help bridge knowledge gaps and promote safer workplace practices.

In conclusion, improving awareness about silicosis is vital to reducing disease burden and ensuring better health outcomes for at-risk workers. Policymakers should consider the study's findings to develop sustainable,

Evidence-based interventions for the prevention and early detection of silicosis in high-risk regions like Sikandra. Future research should explore the effectiveness of educational and preventive interventions, as well as longitudinal studies to monitor knowledge retention and changes in workplace practices over time.

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