Research Article

PREVALENCE OF TUBERCULOSIS AMONG STONE CUTTERS IN BELAGAVI DISTRICT – A CROSS SECTIONAL STUDY

Amardeep S.¹, Dr. Ashwini N.² and Dr. Mubashir A³*

¹Post Graduate Student, Masters of Public Health, JNMC, KLE Academy of Higher Education and Research, Belagavi
²Asst. Professor, Department of Public Health, JNMC, KLE Academy of Higher Education and Research, Belagavi
³Professor, Department of Public Health, JNMC, KLE Academy of Higher Education and Research, Belagavi

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ABSTRACT

Background: A quarter of the world’s population is infected with Tuberculosis, making it a major public health problem with increasing morbidity and mortality. Silicosis, commonly seen in stone cutters is associated with tuberculosis.

Objective: To find the Prevalence of Tuberculosis in stone cutter in Belagavi.

Methodology: A cross sectional study was conducted among 138 participants working in the stone industry/stone cutters selected by simple random sampling technique. Using the pretested questionnaire data was collected. They were diagnosed based on the clinical symptoms and referred to the tertiary care centres for conformation of tuberculosis.

Results: The prevalence of tuberculosis is 2(1.45%) among stone cutters. It was seen that all the participants had more than 15 years of exposure and were in the age group of above 40 years.

Conclusion: There is a need to make more awareness about safety measures to decrease occupational exposure and there should be need for continuous screening for tuberculosis among stone cutters.

INTRODUCTION

Tuberculosis continues to be a major public health problem in India, it is estimated with 2.3 million new cases yearly, creating the maximum TB problem country in the world. TB is an infectious disease caused by Mycobacterium bacilli. It generally affects the lungs but can also affect other parts of the body. It is a curable disease.¹

One fourth of the world’s population is infected with TB. In 2017, 10 million people globally became sick with TB. There are 1.3 million TB related death worldwide.¹

Tuberculosis with silicosis is considered as a major problem infection of lungs as combined with silicosis and together entry is known as silico – tuberculosis as silicosis itself is a risk factor for TB. Silicosis is an occupational lung disease caused by the interstitial deposition of crystalline silica (SiO₂). Silicosis is an increasing interstitial lung disease, categorized by shortness of cough, breath, fever. it can be extend in three different forms i.e. acute, accelerated and chronic.²

Acute: Symptoms happen a few weeks up to Years after exposure to large amount of silica.³

Accelerated: Notice signs about 5 to 10 years heavy exposure to silica.³

Chronic: problem may not show up until decades after your exposure to low or moderate amounts of silica. Symptoms may be mild at first and slowly worsen.³

Exposure to huge amounts of free silica can go ignored because silica is odorless, non-irritant and does not cause any urgent health effects. It affects the lung tissue due to inhalation of crystalline silica particles of 0.5 to 5 microns in size.

It occurs most usually as an occupational disease of people. The main source of silica exposure the people who work in stone cutting, stone mine, quarrying, tunneling, mining,

*Corresponding author: Dr Mubashir Angolkar
Professor, Department of Public Health, JNMC, KLE Academy of Higher Education and Research, Belagavi
polishing, sandblasting, glass manufacturing, coal miners, and manufacture and building construction industries. Exposure to huge amounts of free silica can go ignored because silica is odorless, non-irritant and does not cause any urgent health effects. For diagnosing of silico – tuberculosis many tests can be done like chest x-ray, CT scan, Bronchoscopy, Biopsy, and sputum test. Among them chest radiograph is the most essential tool. There is a direct relationship between the severity of chest radiographic changes and degree of silica exposure. In primary stages, there is ‘reticulation’ of the lung fields due to ticking of peri-vascular and inter-communicating lymphatics. The silicotic nodules initially are 2-5 mm in diameter, homogenous in density and usually bilaterally symmetrical. In later stage the silicotic nodules frequently unite and conglomerate to form large shadow of ‘Progressive Massive Fibrous’ (PMF).

In 1995, the World Health Organization and the International Labor Organization began a public awareness and prevention campaign to eliminate silicosis from the world by 2030. Several countries – China, Brazil, Thailand, South Africa, Malaysia, Indonesia, Mexico, Poland, Turkey, Ukraine, the Bolivarian Republic of Venezuela and Viet Nam – have started national programs for the elimination of silicosis. However, in many developing countries, including India, continues to be an occupational health hazard.

After the enactment of Factory Act 1948 still elimination of silicosis in India is a main challenge due to the variations in silica concentration and duration of exposure in the work environment the reported prevalence of silicosis in India ranges widely-from 3.5% among 1997 workers in an ordnance factory to 54.6% in 593 workers in the slate-pencil industry.

In 1999, the Indian Council of Medical Research reported that around 3.0 million workers are at high risk of exposure to silica; of these, 1.7 million work in mining or quarrying activities, 0.6 million in the production of non-metallic products (such as refractory products, structural clay, glass and mica) and 0.7 million in the metals industry. There are also around 5.3 million construction workers at risk of silica exposure. The National Human Rights Commission of India (NHRC) has directed the governments of the states and union territories of India to provide complete information about all measures taken to prevent and eliminate the problem of silicosis.

Awareness is being raised through information materials printed in the local language. Silicosis health-care units have been established in silicosis-risk districts, where free chest X-ray and pulmonary function tests are done. Regular inspections are made of industries that use silica, with active involvement of nongovernmental organizations (NGOs) to ensure proper monitoring.

Many studies are conducted in different countries of the world but no studies are conducted in Karnataka. Hence the present study helps to estimate the prevalence of tuberculosis in silicotic patients.

MATERIALS AND METHODS
The present study was undertaken to identify the prevalence of tuberculosis in silica industry worker. The detail research methodology adopted for the study including the methods, tools and techniques, study area and procedures followed in the selections of samples, collection of data analysis has been described in this chapter.

Study Design: Cross Sectional Study

Source of Data: Population working in the stone industry or stone cutters.

Study Period: August 2018 to Feb 2020
Data Collection Period-March 2019 to Dec 2019

Study Population: People exposure to Silica dust more than 10 year.

Sample Size: 138
n = Z2 x p x (100-p)
d2
Where n= number of subjects required,
Z= 1.9
p= 10%
d= 5% (possible error)
Hence, sample size = (1.96)2 x 10 x 90 =138 (52)

Sampling Technique: simple random technique

Inclusion Criteria
a. Participants exposed with more than 10 year to Silica dust.
b. Participants of age above 18 years.

Exclusion Criteria
Participant who did not give consent.

Data Collection Tool
Structured Pre-tested questionnaire.

Data Collection Procedure
Permission from the concerned authority was obtained. The study procedure was explained to the participants and the informed consent was obtained. Information of sociodemographic and then details of exposure to silica dust was collected.

Diagnostic Criteria
Based on the clinical signs and symptoms of cough, fever they were diagnosed to have tuberculosis. For the further confirmation they were referred to tertiary care centers.

Data Analysis
Data was analysed using SPSS software version- 20.1 software.

RESULTS
This Cross-section study was conducted on stone crusher participants who are exposed to more than 10 years by visiting different stone crusher mills for a period of 10 months from March to 31st December 2019.
Data Analysis and Interpretation

Data collected was tabulated and statistically sorted. Data was collected at one time using the pre tested questionnaire. The baseline data was collected through pretested questionnaire by face to face interview and based on the clinical signs and symptoms of cough, fever they were diagnosed to have tuberculosis. For the further conformation they were referred to tertiary care centers.

Socio-demographic profile

Table 1 Age wise distribution of the participants.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Percentage% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 30</td>
<td>28.3 (39)</td>
</tr>
<tr>
<td>31 - 40</td>
<td>52.9 (73)</td>
</tr>
<tr>
<td>41 - 50</td>
<td>9.4 (13)</td>
</tr>
<tr>
<td>51 - 60</td>
<td>7.2 (10)</td>
</tr>
<tr>
<td>Above 61</td>
<td>2.2 (3)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (138)</td>
</tr>
</tbody>
</table>

Table no.1 shows the distribution of study participants according to their age in years. Highest distribution with 52.9% was seen in the age group of 31-40 years. Followed with 28.3% in under below 30 yrs. with lowest with 2.2% in age group above 61 years.

Table 2 Literacy status of the participants

<table>
<thead>
<tr>
<th>Literacy status</th>
<th>Percentage% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>13.8 (19)</td>
</tr>
<tr>
<td>Secondary school completed</td>
<td>47.1 (65)</td>
</tr>
<tr>
<td>Higher secondary completed</td>
<td>32.6 (45)</td>
</tr>
<tr>
<td>Degree completed</td>
<td>5.8 (8)</td>
</tr>
<tr>
<td>Post graduate degree completed</td>
<td>0.7 (1)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (138)</td>
</tr>
</tbody>
</table>

Table no 2: - In the present study among 138 participants 19(13.8%) were illiterate,65(47.1%) had completed secondary school,45(32.6%) completed higher secondary, 8(5.8%) degree and 1(0.7%) of them was a post graduated.

Table 3 Distribution of participants based on duration of exposure.

<table>
<thead>
<tr>
<th>Years</th>
<th>Percentage% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>22.5 (31)</td>
</tr>
<tr>
<td>11 - 15</td>
<td>69.6 (96)</td>
</tr>
<tr>
<td>16 - 20</td>
<td>5.8 (8)</td>
</tr>
<tr>
<td>21 - 25</td>
<td>.7 (1)</td>
</tr>
<tr>
<td>26 - 30</td>
<td>.7 (1)</td>
</tr>
<tr>
<td>Above 31</td>
<td>.7 (1)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (138)</td>
</tr>
</tbody>
</table>

Table no 3 Shows the distribution of study participants according to their duration of exposure. Most of the participants were 11-15 years age group 96(69.6%), 31(22.5%) were 10 years age, 8(5.8%) were 16-20 years age group, 1(0.7%) were more than 21 years participants.

Table 4 Distribution of participants based on total income of a household per month (Modified BG Prasad’s Socio-economic Classification-2019)

<table>
<thead>
<tr>
<th>Social class</th>
<th>Income per month</th>
<th>Percentage% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>7008 and above</td>
<td>2.17 (3)</td>
</tr>
<tr>
<td>II</td>
<td>3504 - 7007</td>
<td>14.49 (20)</td>
</tr>
<tr>
<td>III</td>
<td>2102 - 3505</td>
<td>34.06 (47)</td>
</tr>
<tr>
<td>IV</td>
<td>1051 - 2101</td>
<td>41.30 (57)</td>
</tr>
<tr>
<td>V</td>
<td>1050 and Below</td>
<td>7.97 (11)</td>
</tr>
</tbody>
</table>

Table no 4 shows that among 138 participants, 57(41.3%) were in class IV, 47(34.06%) were in class III, 20(14.9%) were in class II, 11(7.97%) were in class V, 3(2.17%) were in class I.

Table 5 Distribution of the participants based on their consumption of tobacco product and Alcohol

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Percentage % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco chewing</td>
<td>37 (51)</td>
</tr>
<tr>
<td>Smoking</td>
<td>11.60 (16)</td>
</tr>
<tr>
<td>Mava/Gutkha</td>
<td>23.90 (33)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>26.80 (37)</td>
</tr>
</tbody>
</table>

Table no 5 Shows that among 138 participants, 51(37%) were tobacco chewers, 11(11.6%) were Smokers, 33(23.9%) were mava/gutkha chewers and 37(26.8%) were alcoholic consumers.

Table 6 Distribution of participants based on symptoms.

<table>
<thead>
<tr>
<th>Symptoms of Tuberculosis</th>
<th>Percentage % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>5.1 (7)</td>
</tr>
<tr>
<td>Coughing of blood</td>
<td>0.7 (1)</td>
</tr>
<tr>
<td>Fever</td>
<td>2.2 (3)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>0.7 (1)</td>
</tr>
<tr>
<td>Chest pain</td>
<td>8 (11)</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>1.4 (2)</td>
</tr>
<tr>
<td>Tired and weak</td>
<td>2.2 (3)</td>
</tr>
</tbody>
</table>

Table no 6 shows Out of 138 participants, 11(8%) had chest pain, 7(5.1%) had cough. 3(2.2%) participants had tired and week, 2(1.4%) had shortness of breath. Coughing of blood and weight loss was observed in only 1(0.7%) participants.

Prevalence

Table 7 Prevalence of Tuberculosis

<table>
<thead>
<tr>
<th>Tuberculosis</th>
<th>Percentage % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+VE</td>
<td>1.45 (n)</td>
</tr>
<tr>
<td>-VE</td>
<td>98.55 (n)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 7 predicts that among 138 participants 2(1.45%) were diagnosed positive TB and maximum participants 136(98.55%) was negative did not show positive TB. So, prevalence of TB is 2(1.45%).

DISCUSSION

The present study aims to find the Prevalence of Tuberculosis in Belagavi district. This study was conducted on stone cutter group people for a period of 10 months from March to 31st December 2019.Total 138 samples were selected from different stone crusher mill using simple random technique methods. Most of the participants 73(52.90%) belonged to the age group of 31 to 40 years followed 39(28.30%) above 40 years. Another study in Rajasthan, had 53(39.80%) male and 36(26.25%) female. Higher number of respondents hailed from joint family than nuclear. Secondary school was completed by 65 participants, higher secondary by 45 and 19 were illiterates. All were males and married were more compared to unmarried.

In a study from Jodhpur, most of the stone workers belonged to 46 to 50 years of age. Another study in Rajasthan, had 53 respondents in 41 to 50 years of age. Also, there were more males compared to females and had no education. These finding are different from our stuy.

57 respondents had a lower middle class, 47 respondents had middle class and 20 respondents had upper middle class. In
Rajasthan, 14 respondents had no income and 10 were earning more than 10,000. 6

96 respondents from our study had 11-15 yrs. of exposure to silica followed by 31 participants less than 10 years where as in a study from Coimbatore average years of duration of exposure was 22 years. Which is almost double to our study findings. 4

Another study among Shakarpur workers with more than 10 years of exposure were 4 times at more risk than those who had less than 10 years of exposure. 5

51 respondents from our study had tobacco chewing, 37 had alcohol consumption, 33 respondents had mawa or gutkha eaten and smoking done by 16 respondents. Another similar study was done in Rajasthan among them 34 participants, 26 had habits of smoking, alcohol consumption or tobacco consumption in a study in. 6

107 participants had no any pain, 15 participants had general pain and chest pain was present in 5 of them followed by cough, eye problems, BP, Sugar, scabies, blood in stools by less than 5 respondents each.

In our study based on the symptoms felt by the 11 participants had chest pain, 7 had cough, 3 had fever and 3 had weakness each and weight loss. Another similar study was conducted in jodhpur district of Rajasthan among them 23 participants had chest pain and 11 had weakness. 6

In this study Prevalence of tuberculosis was found to be 1.45% and another study was conducted in china 138 were undiagnosed it was found to be 29% with average 5.6 years of exposure and history of tuberculosis. 1

Another study was conducted in Godhara and mandsaur in India among 253 quartz crushing unit and 102 slate pencil workers over all the prevalence of TB was found to be 10.7% among quartz workers and 22.5% in slate pencil workers. 10

CONCLUSION

Most of the participants had an exposure for 11-15 yrs. Overall all it was observed that prevalence was 1.45% among the stone cutter.

So, there is a need to make more awareness about safety measures to decrease occupational exposure and there should be need for continuous screening for tuberculosis among stone cutters.

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