# BMR Medicine

## Health Profile of Workers Engaged in Stone Crushing Units Surrounding, Gulbarga City

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## Abstract

A cross sectional study was conducted among workers in 16 stone crushing units to know the health status and various factors influencing on health numbering 150. Out of 150 workers 13.33% were below 25 years and none were above 55 years. In the present study 63.33% workers were illiterates. 80% workers were married and 20% were unmarried. In the present study 84% workers had an exposure of dust for less than 5 years. Major morbidities among the workers with PEFR<400L/min were cough (72.55%), musculoskeletal disorders (60.78%), breathlessness (40.05%), chest pain (39.22%) and skin disorders (39.22%), Major morbidity amongst workers with PEFR (400-600L/min) were cough, (45.33%),  musculoskeletal disorders (38%), and breathlessness (26%). There was no association between education status and morbidity.Smokers had PEFR<400L/min. In the present study there was highly significant association between lung function parameters (PEFR) and age. In the present study lung function parameter was related to duration of  exposure, which  was highly significant. In the present study there was association between Hb% and lung parameter (PEFR). (I.e. lower the Hb% lowers the PEFR). In the present study 54.90% (28) had no respiratory morbidity but PEFR was less than 400L/min.

## Introduction

Urbanization and industrialization has been a universal phenomenon. However industrialization can occur at places where the raw material, work force or ready market for finished product is available. In India, the rapid industrialization took place since1850 onwards and the condition of the working class was abysmal. There was absolutely

no legislation for protection or compensation of workers from occupational diseases or injuries.

The industrial health which encompassed initially only those traditional industries such as foundries, mines, textiles, etc. which came into existence with the availability of power and consequently the industrial health dealt with illnesses or diseases which occurred in these select industries only. However with rapid progress in overall spheres of science and technology, the work force now includes not only of those good old industries with its own peculiar disease pattern. But today the term industrial health is replaced by occupational health due to it.

Dust may seem inconsequential, but can—and does—kill. Dust is a serious occupational hazard and a major cause of occupational disease and work-induced mortality. Workplace dust often contains toxic elements. Respiratory illness among workers in the stone crushing industry is significant problem all over the world. It's estimated that 1 million people worldwide die annually from respiratory illnesses; million were affected in India alone. Billions of rupees were spent annually on their treatment.[1]

Gulbarga is fast expanding regional center of north eastern region of Karnataka a state with fast all round development. One of the raw materials required for rapid urbanization and industrialization is a quarry stone or silica stone which is essential for road and building construction. This particular raw material is abundant in and around Gulbarga city. The workers working in this sector were all unorganized with least scope for provision of health, safety and welfware measures. The health status of these workers is least studied by any health sector, hence a modest attempt is made to study the health status of people working in stone crushing industries around Gulbarga city. In order to make a provision for some sort of token health provision to them we were trying to bring them under the umbrella network of Employees State Insurance Corporation.

## OBJECTIVES

1. To study the health status of workers in stone crushing units.

2. To study the various factors influencing health of the workers.

3. To suggest the various measures for the improvement in the health status of the workers.

### Material Methodology

The present study was carried out surrounding Gulbarga city  Gulbarga city is situated in northern part of Karnataka. Study population comprised of 150 workers engaged in stone crushing units surrounding Gulbarga city. The present study was cross sectional study. Based on peak expiratory flow (Wright peak flow meter) and X-Ray chest

### Inclusion criteria

All the workers who were engaged in the stone crushing units including watchman and drivers

### Exclusion criteria

Other than workers like owner of the unit

### Sample size

The present study was carried out in 16 stone crushing units surrounding Gulbarga city and all workers i.e. 150 were examined

### Method of data collection

All the subjects were personally contacted examined and interviewed using pre-designed and pre-tested proforma.This was followed by a detailed clinical examination, anthropometric measurements and investigations

### Duration of study

The study was conducted for a period of 1 year from December 2007 to Nov 2008

**Results**

**Table No.1 Distribution of workers according to age**

| Age group ( in years) | No. of workers | |
|---|---|---|
| | **No.** | **%** |
| 15-25 | 20 | 13.33 |
| 25-35 | 41 | 27.33 |
| 35-45 | 54 | 36.00 |
| 45-55 | 35 | 23.33 |
| **Total** | **150** | **100.00** |

The above table shows that, among 150 workers 23.33 % (35) were in age group of 45-55years, 36 %( 54) were in the age group of 35-45 years, 27.33 %( 41) were in age group of 25-35 years, and 13.33% were in the age group of 15-25 years.

**Table No.2 Distribution of workers based on education status**

| Education status | No | % |
|---|---|---|
| Illiterates | 98 | 65.33 |
| Primary | 39 | 26.00 |
| Higher primary | 13 | 8.67 |
| **Total** | **150** | **100.00** |

The above table shows that maximum i.e. 65.33 %( 98) were illiterate, while26 %( 39) had primary education, and 8.67 %( 13) had higher primary education.

**Graph no: 1 Distribution of workers based on education status**
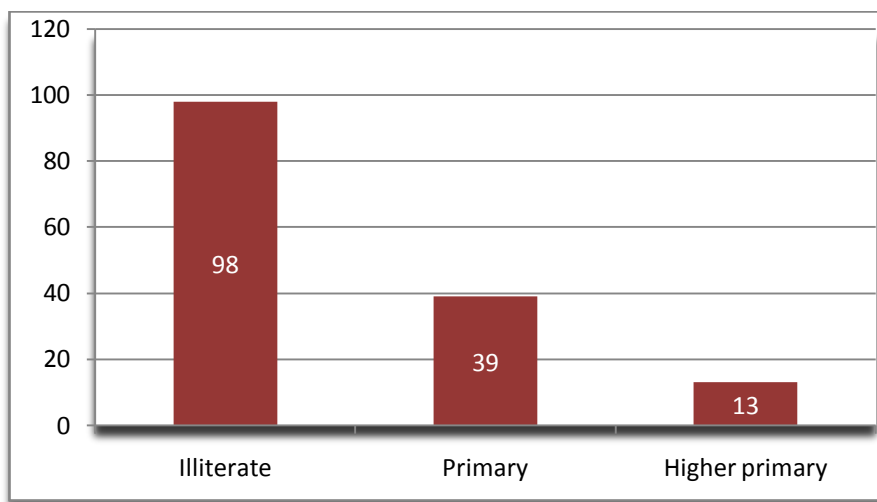
**Table No.3 Distribution of workers based on marital status**

| Marital status | No | % |
|---|---|---|
| Married | 120 | 80.00 |
| Unmarried | 30 | 20.00 |
| **Total** | **150** | **100.00** |

It is observed from above table that 80 %( 120) were married, and 20 %( 30) were unmarried.

**Table no: 4 Distribution of the workers based on physical activity**

| Physical Activity | No | % |
|---|---|---|
| Sedentary | 16 | 10.67 |
| Moderate | 134 | 89.33 |
| **Total** | **150** | **100.00** |

It is observed from the above table that 89.33% (134) were doing moderate physical activity, while rest 10.67% (16) were doing sedentary physical activity.

**Table No.5 Distribution of workers based on duration of exposure**

| Duration of Exposure (in months) | No | % |
|---|---|---|
| ≤20 | 36 | 24.00 |
| 20-40 | 67 | 44.67 |
| 40-60 | 23 | 15.33 |
| 60-80 | 18 | 12.00 |
| 80-100 | 5 | 3.33 |
| ≥100 | 1 | 0.67 |
| **Total** | **150** | **100.00** |
| **Mean±SD** | **34.69±21.41** | |

It is observed that maximum duration of exposure was $1^{1/2}$ to 3 years i.e. 20-40 months i.e. 44.67% (67) while 24% (36) had exposure < 20 months, while 15.33% (23) had exposure 20-60 months , 12% (18) had exposure for 60-80 months , 3.33%(5) had exposure for 80-100 months and 0.67%(1) had exposure for ≥100 months.

**Table no.6 Morbidities Amongst the workers**

| Morbidities | PEFR (<400) (n=51) | % | PEFR (400-600) (n=99) | % | Total | % | χ²-Value | P-value |
|---|---|---|---|---|---|---|---|---|
| Eyes | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | -- |
| Deafness | 6 | 11.76 | 1 | 1.01 | 7 | 4.67 | 6.50 | P<0.05 |
| Skin Disorders | 20 | 39.22 | 8 | 8.08 | 28 | 18.67 | 21.49 | P<0.001 |
| HTN | 10 | 19.61 | 2 | 2.02 | 12 | 8.00 | 11.86 | P<0.001 |
| Cough | 37 | 72.55 | 31 | 31.31 | 68 | 45.33 | 23.10 | P<0.001 |
| Breathlessness | 24 | 47.05 | 15 | 15.15 | 39 | 26.00 | 17.81 | P<0.001 |
| Chest pain | 20 | 39.22 | 7 | 7.07 | 27 | 18.00 | 23.56 | P<0.001 |
| Musculoskeletal | 31 | 60.78 | 26 | 26.26 | 57 | 38.00 | 17.03 | P<0.001 |

The above table shows that higher morbidities were seen in workers with PEFR <400l/min as compared to lower morbidities in workers with PEFR (400-600L/min). Highest morbidity is seen in the form of cough 72.55% (37 PEFR <400L/min) and lowest 31.31% (31 PEFR 400-600L/min) the second highest morbidity is seen in form of musculoskeletal complaints 60.78% (31 PEFR <400L/min), followed by breathlessness 47.05% (24<400L/min) followed by 26.26% (26 PEFR 400-600l/min) skin and chest pain complaints showed equal morbidity i.e. 39.22% (PEFR <400L/min).

**Table no.6 Association between education status and morbidity**

| Morbidity | Illiterates | % | Primary | % | Higher primary | % | Total | χ²-Value | P-Value |
|---|---|---|---|---|---|---|---|---|---|
| Eyes | 0 | 0 | 0 | 0.00 | 0 | 0.00 | 0 | -- | |
| Deafness | 5 | 71.43 | 2 | 28.57 | 0 | 0.00 | 7 | 0.0036 | P>0.05 |
| Skin disorders | 21 | 75.00 | 6 | 21.43 | 1 | 3.57 | 28 | 2.25 | P>0.05 |
| Hypertension | 8 | 66.67 | 2 | 16.67 | 2 | 16.67 | 12 | 0.44 | P>0.05 |
| Cough | 40 | 58.82 | 18 | 26.47 | 10 | 14.71 | 68 | 0.55 | P>0.05 |
| Breathlessness | 26 | 66.67 | 8 | 20.51 | 5 | 12.82 | 39 | 2.41 | P>0.05 |
| Chest pain | 13 | 48.15 | 9 | 33.33 | 5 | 12.82 | 27 | 0.44 | P>0.05 |
| Musculoskeletal disorders | 31 | 54.39 | 17 | 29.82 | 9 | 15.79 | 57 | 0.02 | P>0.05 |

It was observed from above table that there is no association between education and morbidity.

**Table no.7 Lung function Parameter according to Duration of exposure**

| Duration of exposure ( in months) | PEFR (<400L /min) | % | PEFR (400-600L/min) | % | Total | % |
|---|---|---|---|---|---|---|
| <20 | 8 | 15.69 | 28 | 28.28 | 36 | 24.00 |
| 20-40 | 19 | 37.25 | 48 | 48.48 | 67 | 44.67 |
| 40-60 | 8 | 15.69 | 15 | 15.15 | 23 | 15.33 |
| 60-80 | 10 | 19.61 | 8 | 8.08 | 18 | 12.00 |
| 80-100 | 5 | 9.80 | 0 | 0.00 | 5 | 3.33 |
| ≥100 | 1 | 1.96 | 0 | 0.00 | 1 | 0.67 |
| **Total** | **51** | **100.00** | **99** | **100.00** | 150 | 100.00 |
| **Mean±SD** | **44.55±25.76** | | **29.80±16.59** | | | |

The above table shows that there is highly significant association between lung function parameter (PEFR) with duration of exposure. More is the duration of exposure in months, lower is the PEFR.

**Table no.8 Distribution of respiratory morbidity among workers based on PEFR**

| Respiratory Morbidity | PEFR (<400L/min) | % | PEFR (400-600L/min) | % | Total | % |
|---|---|---|---|---|---|---|
| Normal | **28** | **54.90** | 99 | 100.00 | 127 | 84.67 |
| Silicosis | 18 | **35.29** | 0 | 0.00 | 18 | 12.00 |
| Silico-tuberculosis | 5 | **9.80** | 0 | 0.00 | 5 | 3.33 |
| **Total** | **51** | **100.00** | **99** | **100.00** | **150** | **100.00** |

Above table shows that 54.90% of workers with less than 400L/min PEFR were normal, were as 45.1% had either silicosis and silicotuberculosis in 52(23%) similarly 127 workers with PEFR 400-600L/min were normal.

**Table no.9 Association Between confirmed cases with duration of work**

| Confirmed Cases (x-ray chest) | Duration of work (in months) mean±SD | t-value | d.f | P-value |
|---|---|---|---|---|
| Silicosis(n=19) | 68.84±22.57 | 9.43 | 143 | P<0.001 |
| Silicotuberculosis(n=5) | 38.4±5.37 | 1.24 | 129 | P>0.001 |
| Minor ailments( n=126) | 29.45±16.01 | | | |

It is observed from above table that maximum workers had exposure of mean± SD29.45±16.1 i.e. (126) the remaining 19 cases of silicosis who had exposure of mean ±SD of 68.84±22.57 of months i.e. prolonged duration as compared to silico-tuberculosis only 5 cases were detected who had exposure of 38.4±5.37 months i.e. lesser duration of exposure.

## DISCUSSION

The present cross sectional study was conducted among workers in stone crushing units surrounding Gulbarga city. The study was carried among the workers working in 16 stone crushing units numbering 150 with the objective of studying the health status and various factors influencing the health. In the present study 63.33% workers were between 25-45 years. None of the workers were below 15 years or above 55 years as stone crushing is a heavy manual work.

Similar findings were observed by Rajnarayan .T et al (2004) in his study among quartz stone grinders of Chotedepur i.e. 48.6% workers were between 30-45 years age group.[2,3] In the present study 65.33% were illiterate, as a whole literacy is low in Gulbarga district with a total literacy percentage of only 50.65%.[4] However R.D Tribuwan et al found out similar findings among stone quarry workers of 68% illiterates in his study.[5] In the present study 80% of the workers were married. Marriage is a universal phenomenon and the workers belonged to the reproductive age group. The average marital status according to Census 2001, male (45.6%) and married female (43.6%) the mean age at marriage for females, who married in the last five years, has been 23.5 years in the country.[6]

In the present study 84% workers were working for less than 5 years duration, 16% were working for more than 5 years. It was observed that V.B.Ghotkar et al 42% < 5 years duration of exposure and 58% had 2 years exposure.[7] The workers were divided into two groups based on peak expiratory flow rate. The workers with less than 400L/min PEFR is considered as abnormal and 400L/min and above considered as normal. The higher morbidity is seen in workers with less than 400L/min as compared to workers with PEFR more than 400L/m. The highest morbidity was cough (72.5%) followed by musculoskeletal complaints (60.78).The morbidity chest complaints and chest complaints (39.22%) and skin disorders (26.26%). Similar finding was found in W.H.O report 2002 that low back pain 37%, hearing 16%, COPD 13%, asthma11%, lung cancer 9% and leukemia 2%.[8] And also P.Tay found severe noise induced deafness in his study.[9]

Another study done by Dr.AdrianaTodia et al showed hearing loss 34.4%, bronchial asthma 7.85%, chronic bronchitis 2.4%, skin diseases 2.5% and musculo skeletal 1.2%.[10]

It was observed from the above table that there is no association between educational status and morbidity. It was observed from table no 15 that

there is highly significant association between smoking and lung parameters. Similar observation was made by V.B Ghotkar et al in his study.[7]

It was observed from table 16 that there is highly significant association between lung function parameter and age as seen in the form of inverse proportion as age in advancing there is lowering in lung function. However V.B.Ghotkar ET AL (1995) in their study found a decrease in pulmonary function with increase in years of exposure, which is not found statistically significant.[7]

It was observed from table 17 that there is highly significant association between lung function parameters with duration of exposure more is the duration of exposure in months, lower is the PEFR(P <0.001). Similar observation was made by Rajnarayan.R. Tiwwere et al that lung function parameters is reduced with increasing duration of exposure PEFR was 6.49±2.68 in subjects exposed 1-2 years 5.13±1.92 in subjects who were exposed to 3-4 years and 4.71±2.16 in subjects who were exposed for ≥ 4years.[11]

From table no 18 it was observed that there is highly significant association between Hb% with lung function parameter as seen in the form of lower Hb%, lower lung function parameter , higher is the Hb% higher is lung function Parameter(PEFR). Similar findings were found by R.R.Tiwari (2005) in his study.[12]

From the table no 19 it was observed that the lung function parameter (PEFR) higher in the respiratory morbidity in the form of silicosis and silicotuberculosis on the other hand among 127 workers with normal respiratory morbidity 84.67% have good lung function parameters i.e.(PEFR 400-600l/Min). Similar findings were found in the study conducted by National institute of occupational health (1980) found that silicosis in 17.7%, tuberculosis in 5.3% and silicotuberculosis in 23% of workers. [13]

## Conclusion

To conclude workers at stone crushing units developed silicosis, silico-tuberculosis and also

have reduced lung function capacity within 5 years of exposure due to silica. These workers had protective gears in order to not to inhale silica dust. The industry also requires dust elimination measures at the site of production in order to not to contaminate the environment. Respiratory device worn over the mouth and nose or entire head to protect the user from inhaling harmful agents.. Regular monitoring of dust exposure is essential in order to assess occupational exposure and to evaluate the effectiveness of dust control measures. Pre-employment and annual chest X-rays. Chest X-ray screening is useful in the early detection of silicosis. Source controls by engineering change made to eliminate or reduce exposure at a point where the hazard is generated. Air monitoring by using specialized equipment to measure types of pollutants and their concentrations in the atmosphere.

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