



A Cross-Sectional Study on Morbidity Profile Among Workers At A Brick Klin Factory in Southern India

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ABSTRACT:

Background: The brick manufacturing industry in India is the second largest in the world following China. Brick kiln workers suffer from high morbidity because of their work. The study was primarily focused on detecting the evidence regarding the occupational hazards among brick factory workers. Methods: A total of 125 workers with at least 6 months of experience were included in the study. The data were collected using a semi-structured pretested questionnaire to obtain information on the demography and occupational exposure history. Specific questions were asked on the effects of exposure such as watering of eyes, reddening of eyes, foreign body sensation, upper respiratory tract symptoms, headache, excessive fatigue, and other musculoskeletal-related conditions such as generalized body ache, muscle cramps etc. A thorough physical examination was done to find out existing morbidities. Anthropometric measurements like height, weight and vitals like blood pressure, spo2 were recorded. Analysis was done by calculating frequency, percentages, and standard deviation from the data. Descriptive statistics were presented with frequency tables. Association was illustrated with cross tables, chi square test and Z test. Results: The majority of workers 57(45.6%) were in the age group 31-40 years, as the duration of employment increased, the proportion of workers with morbidities also increased. Among the workers who were working for a long period (more than 10 years), all workers were suffering from one or other musculoskeletal disorders followed by respiratory morbidities among 73(58.4%) workers. Conclusion: Musculoskeletal disorders were the most common morbidities followed by respiratory morbidities. As the duration of employment increased, the morbidity profile among Brick klin workers also increased.

INTRODUCTION

The brick manufacturing industry in India is the second largest in the world following China, in which the majority of the workforce is a part of the unorganized sector, which comprises migrant workers¹. Brick kiln workers suffer from high morbidity because of their work². Brick manufacturing involves three main steps: clay shaping with water (molding), drying with solar energy, and firing with fuel (baking). Workers at brick kilns are involved in either carrying the clay dust and bricks, molding, or baking. Emissions from brick kilns comprise fine dust particles, hydrocarbons, Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Fluoride compounds, Carbon Monoxide (CO), and small amounts of carcinogenic dioxins if rubber tyres were used as fuel³. They are prone to occupational hazards related to

respiratory illnesses such as chronic cough, chronic phlegm and chest tightness resulting from exposure to high concentrations of dust. Also, inappropriate working postures involved in brick making with the repetitiveness of the movements at the upper limbs, where the joints and muscles are held in uncomfortable physiological positions for protracted periods of time, in suboptimal working conditions, insufficient recovery time makes them prone to work related musculoskeletal disorders⁴. These musculoskeletal disorders affect their activities of daily living (ADL), leading to slow economic growth of their families resulting in poor overall quality of life⁴.

The brick kilns are maintained at temperatures which ranged between 900°C to 1100°C and these workers were continuously exposed to high thermal radiation for 8 to 10 hours a day. This hot, humid environment can put the



workers through considerable heat stress disorders ranging from minor discomforts (like heat rash, and heat cramps) to major life-threatening conditions (like heat exhaustion, and heat stroke)⁵. They are also exposed to the sun for long hours, high concentrations of hazardous dust, open fires, hot surfaces, etc. Because of all these things they get various types of illnesses like skin allergies, eye irritation, tuberculosis etc⁶. As the kilns are operated in remote areas, they mostly remain unregulated, and wages paid are very often less than the statutory minimum wages leading to financial stress⁶. In spite of all these health conditions that affect kiln workers, there is no documentation that will attract the attention of public health authorities to the plight of these workers. Hence, this study is planned to document the health problems of the Brick-Kiln Workers and get an idea about the proportional morbidity among them.

MATERIALS AND METHODS:

The present study was a cross-sectional study conducted at a brick kiln factory in Southern India for the duration of two months from June 2024 to August 2024. Institutional Ethics Committee approval was obtained before conducting the study, informed consent was taken from the participants after explaining the purpose, and benefits of participation in the study, and verbal consent was obtained. After obtaining prior written permission from the administration department of a Brick kiln factory, with all safety measures we entered into the factory and the environment in the factory was observed.

A total of 125 workers with at least 6 months of experience were included in the study by universal sampling method. The data were collected using a semi-structured pretested questionnaire to obtain information on the demography and occupational exposure history. Specific questions were asked on the effects of exposure such as watering of eyes, reddening of eyes, foreign body sensation, upper respiratory tract symptoms, headache, excessive fatigue, and other musculoskeletal-related conditions such as generalized body ache, muscle cramps, etc. A thorough physical examination was done to find out existing morbidities. Anthropometric measurements like height, weight and vitals like blood pressure, spo2 were recorded.

Data collected were verified, coded as required and entered in MS-Excel. Analysis was done by calculating frequency, percentages, and standard deviation from the data. Descriptive statistics were presented with frequency

tables. Association was illustrated with cross tables, chi square test and Z test.

RESULTS

Table 1 shows sociodemographic and work-related characteristics among study population. Majority of workers 57 (45.6%) were in the age group 31-40 years followed by 34 (27.2%) patients in the age group 21-30 years.

Table 2 shows morbidity profile among study population. All the workers were found to have musculoskeletal morbidities. The next common morbidity found was Respiratory morbidities among 73 (58.4%) workers.

Table 3 shows association between duration of employment and morbidity profile among study population. As the duration of employment increased, the proportion of workers with morbidities also increased during first few years of employment and then decreased. This variability in morbidity profile was statistically significant for neurological disorders. Among the workers who were working for a long period (more than 10 years), musculoskeletal disorders were more common followed by respiratory morbidities.

DISCUSSION

In our study, most workers were aged 21-40 years (young and middle-aged). In a Brick kiln factory, all operations from moulding to carrying the finished products have to be carried manually by the workers. This could be the reason for employing manpower in their youthful and physically fit age. These findings are similar to a study conducted by Nazrul et al.⁵ in which they observed young (15-29 years) and middle age (30-44 years) grouped population formed the majority which constitute 51.78% of the total workers. Similarly, in another study by Rufiat et al.⁶ mean age of the workers was 35.34 years. In this study, maximum number of workers were working in factory since 2-4 years. These findings were similar to a study conducted by Nazrul et al.⁶ who also observed that majority of workers had been working since 2-4 years which was 55.6%.

In our study, all the workers were suffering from one or other morbidity. These findings are almost similar to a study conducted by Rufiat et al.⁷ in which they observed that about 96.7% of the respondents were suffering from some or the other complaints, while 14 (3.3%) were not suffering from any complaints. On the contrary,



Shashikanth et al.⁸ observed only 68.50% of workers had some kind of morbidity in their study.

In our study, all the workers were suffering from one or other musculoskeletal disorders in which pain and low backache were the most common disorders. A prolonged time (8-14 hours in a day) of work might lead the workers susceptible to various musculoskeletal disorders. Similar to our study, in a study by Rufiat et al.⁷ the most common musculoskeletal symptom experienced by the participants was pain in the lower back in 279 (66.4%) participants. Those who were working for less than/equal to 5 years and 6-10 years (72.4% and 70.7%) reported more musculoskeletal symptoms as compared to those who were working for more than 10 years. Similarly, Navya et al.⁹ identified most common morbidities were musculoskeletal pain (48%) and low backache. On the contrary, in a study by Mehta R et al.¹⁰ identified most of the common morbidity as musculoskeletal disorders among 24.9% workers, and most common symptoms of MSDs are shoulder pain (58%) and low back pain (50.95%).

In our study, about 58.4% workers were suffering from respiratory morbidities. This is because workers are more exposed to smoke, dust, deployed in transportation work which involves loading and unloading of bricks. Rufiat et al.⁷ observed that most commonly experienced respiratory symptom was cough in 103 (24.5%) participants followed by coryza in 67 (15.9%). Significant association was seen between respiratory complaints and age, years of work. Similarly, in a study by Shashikanth et al.⁸ respiratory system (18.10%) was involved in most of those with morbidities. The proportion of workers with respiratory symptoms was 27% and 17.1% in studies conducted by Navya et al.⁹ and Mehta R et al.¹⁰ respectively.

In this study, skin manifestations was present among 24.8% of workers. Rufiat et al.⁷ observed that itching over hands and feet was the most common dermatological symptom in 44 (10.5%) workers. In a study by Navya et al.⁹ the prevalence of skin diseases was lower which was 12% which was lower compared to our study findings.

In this study, 29.6% of workers were suffering from gastrointestinal disorders. On the contrary, Nazrul et al.⁶ observed that an average of 36% workers of in the brick kiln industry have been suffering the various types of digestive disorders. Digestive disorders include abdominal pain, acidity, worm infestation, diarrhea, and vomiting in their study. Mehta R et al.¹⁰ in their study

observed the prevalence of GI disorders as 12.7% which is lesser than our study.

In this study, the prevalence of neurological disorders was 40.8% and headache was the most common morbidity. The long duration of work, direct exposure to the sun, and restlessness could be the cause of a headache. Nazrul et al.⁶ also observed headache in the majority (47%) of workers. Psychological disorders were observed among 48% workers in our study. Rufiat et al.⁷ stated that psychosocial stress behaviors such as long working hours without adequate rest, low wages, and job insecurity might be contributing to stress among workers.

In this study, eye manifestations were the least common morbidity present among 20.8% of workers. These findings are almost similar to a study conducted by Nazrul et al.⁶ who observed that about 20% of the workers reported various types of allergies like dermatological, eye irritation, throat irritation, or combined.

CONCLUSION

Musculoskeletal disorders were the most common morbidities followed by respiratory morbidities. As the duration of employment increased, the morbidity profile among Bricklin workers also increased.

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Table 1: Sociodemographic and work-related characteristics among study population

Sociodemographic and work-related characteristics	Frequency	Percentage
Age (years)		
21-30	34	27.2
31-40	57	45.6
41-50	32	25.6
51-60	02	1.6
Duration of employment (years)		
1-2	19	15.2
2-4	31	24.8
4-6	17	13.6
6-8	08	6.4
8-10	22	17.6
>10	28	22.4
Raw materials utilised		
Clay	05	04
Mud	01	0.8
Coal dust	28	22.4
Rakul	91	72.8

Table 2: Morbidity profile among study population

Morbidities	Frequency (N=125)	Percentage
Gastrointestinal	37	29.6
Respiratory	73	58.4
Neurological	51	40.8
Musculoskeletal	125	100.0
Psychological	60	48.0
Skin manifestations	31	24.8
Eye manifestations	26	20.8

**Table 3:** Association between duration of employment and morbidity profile among study population

Morbidity	Duration of employment						P value
	1-2yrs	2-4yrs	4-6yrs	6-8yrs	8-10yrs	>10yrs	
Gastrointestinal	06	12	06	02	07	04	0.10
Respiratory	11	14	10	05	13	20	0.51
Neurological	12	10	09	02	05	13	0.07*
Musculoskeletal	19	31	17	08	22	28	-
Psychological	10	11	07	05	11	16	0.53
Skin manifestations	02	08	05	04	07	05	0.27
Eye manifestations	09	06	02	02	04	03	0.12