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Morbidity Profile of Workers in Brick Kilns under a Gram Panchayat, South India

Navya C J[1], Deepthi Shanbhag[2], Naveen R[2], Swathi S[3], Laviena M[3], Krupa T[3]

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Author's Affiliation:
[1]Assistant Professor, Dept of Community Medicine, Amala Institute of Medical Science, Thrissur, Kerala; Dept of Community Health; [2]Associate Professor, Dept of Community Health; [3]Intern, St. John's Medical College, Bangalore

Correspondence:
Dr Deepthi N Shanbhag
deepthi.shanbhag@gmail.com

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ABSTRACT

Introduction: Brick Industry in India is a small scale industry which employs large number of migrant workers from rural areas. The stress at the work place, long hours of work and poor environmental conditions in and around brick making units have an impact on the workers health.

Objective: To assess the morbidity profile of workers in brick kilnsina Gram Panchayatarea in Karnataka.

Methods: A pre designed and structured interview schedule was used to collect data with physical examination and pulmonary function testing using Wright Peak Flow Meter (PEFR) was done. Data was analyzed using SPSS Version 16.

Results: Most Common morbidities identified were musculoskeletal pain (48%), under weight (31%), respiratory diseases (27%), skin diseases (12%), eye complaints (8%) and work place injuries (5%).Prevalence of tobacco use was 67%.78% of the workers had PEFR less than normal even though there was no statistically significant association between PEFR and respiratory morbidity or duration of work. There was no provision of personal protective equipments (PPE) in any of these factories.

Conclusion: An improvement of working environment, residential quarters and enforcement of safety devices are needed in the factories studied. Pre-placement and periodic examination should be done to identify at risk individuals.

Key words: Morbidity, Brick kiln workers, South India

INTRODUCTION

As per the Economic Survey of 2007-08, out of 440 million workers in India, 93% of the workers are in the unorganized sector[1]. The contributions made by the unorganized sector to the national income are very substantial as compared with that of the organized sector[2]. A subcommittee of the National Commission for Enterprises in the Unorganized Sector in 2012 estimated that the contribution of unorganized sector to Gross Domestic Product is about 53.9%[3]. Brick kiln industry is one such sector. Bricks have been used for construction since Indus civilization in Indian subcontinent and use of bricks has gradually increased due to urbanization process in India[3].Currently, India is the second largest producer of bricks after China[3].There are around100,000 authorized production units where in Karnataka or India and more than equal number of rural enterprises in the unorganized sector.[3]As a result brick sector provides direct employment to more than 8 millionworkers.[3]There are around 10,000 brick-kiln units operating throughout Karnataka State[3].Evidently, it is the single largest source of employment generation in unorganized sector.

As per National Commission for Enterprises in the Un-organized Sector (NCEUS), workers in brick kilns are victims of adverse working environmen-

tal conditions and subjected to health hazards of occupational origin[4,5]. These workers are poor and vulnerable. Their employment is totally temporary in nature[6].The socio-economic stresses are one of the major outcomes of their occupation. Security measures are not being provided or adopted by them while working. They are being exploited by the contractors. There is no specified time limit/frame of work for them. They have to work on an average for about 10 hours/day[7]. They are mostly migratory workers and hence make them more vulnerable to health problems. Most of the time, they are at risk of sustaining injuries and accidents[8-13]. The other important and common morbidities identified are respiratory, musculo skeletal and other minor illnesses[14]. Studies have shown lack of awareness related to cause, spread of disease in the work environment, ignorance and hesitance to use safety measures during the work, poor health seeking behaviours as being the risk factors among the brick kiln workers[15].Hence the present study was undertaken to assess the morbidity profile of workers in brick kilns.

MATERIALS & METHODS

This was a cross sectional descriptive study conducted among the workers of brick kilns which come under a Gram Panchayath area in Bangalore Urban District. The study was undertaken in September and October 2012.A list of brick kilns was obtained from the Panchayath office. Brick kilns were visited and written permission for the study was obtained from the brick kiln owners. All workers present at the brick kiln on the day of data collection were included in the study. There were ten brick kilns with a total of 100 workers. Twenty workers who could not be contacted even after two visits to the brick kilns were excluded from the study. After obtaining informed written consent from the workers, data was collected using a structured interview schedule, which was designed based on literature review of similar studies. It included socio demographic details, occupational history, personal habits, medical history and health seeking behavior. This was followed by a general physical and systemic examination. Mini- Wright Peak Flow Meter produced by Clement Clarke International, England[16], was used to measure PEFR of each worker. The maneuver was repeated thrice and best out of three readings was taken. A structured brick kiln observation check list was used to do a brick kiln and residential quarter's walkthrough to assess the health hazards both at the work place and in residential quarters. The data collected was entered in Microsoft Excel and analyzed using SPSS version 16. The demographic data and morbidities were analyzed using statistical measures such as frequencies, mean and standard deviation. Statistical tests of significance used were Mann Whitney U test and Chi square test.

RESULTS

A total of 100 brick factory workers were recruited for this study. There were 50(50%) male and 50(50%) female workers. The mean age was 29 ± 11 years. The demographic profile of the study population is as shown in *Table 1*.

Majority of the workers (82%) were migrants from other states and were contractual (90%). Among those who had completed 1 year 22(33%) had worked for 12 months in a year. The mean duration of work was 10 ± 2 hrs with a range of 4 – 15 hrs. Thus 66% of them reported of doing overtime work (>8hrs). Forty three (43%) workers had worked in other brick factories previously. Table 2 depicts the work profile of the study population.

Use of Personal Protective Equipments: Only 2 out of the 10 brick kilns provided personal protective equipments like gloves and gum boots to their workers. Out of the 16 workers in these 2 brick kilns 9 reported that they were provided gloves, but only 6 were using it. Only one person was provided gumboots. Other PPEs like mask, goggles, coveralls, and helmets were not provided in any brick kilns. However workers opined it is uncomfortable to work wearing PPEs and they preferred to work without them. They were also not aware of the importance of using PPEs while working.

Table 1: Demographic Profile of the study population

Variable	Participants (n=100)(%)
Sex	
Male	50(50%)
Female	50(50%)
Age (years)	
≤ 15	3(3%)
16-30	*63(63%)*
31-45	26(26%)
46-60	6(6%)
>60	2(2%)
Marital Status	
Married	*77(77%)*
Unmarried	22(22%)
Separated	1(1%)
Type of family	
Nuclear	*82(82%)*
Joint	4(4%)
Three generation	7(7%)
Others	7(7%)
Education	
Illiterate	*59(59%)*
Primary	9(9%)
Secondary and high school	29(29%)
PUC	3(3%)

Table 2: Profile of the job of the workers in the brick kiln (n=100)

Variable	Workers (%)
Type of employee	
Contractual	90 (90.0)
Employed	10 (10.0)
Job category	
Clay screening, mixing& moulding	85 (85.0)
Loading& unloading	13 (13.0)
Others(tractor driver)	2
Years of work in the present factory	
<1 year	67 (67.0)
>1 year	33 (33.0)
Months of work in a year (n=33)	
6	6 (18.0)
8	2 (6.0)
10	1 (3.0)
11	2 (6.0)
12	22 (67.0)
Days of work per week	
4	3 (3.0)
5	34 (34.0)
6	63 (63.0)
Years of work in any brick factory(In years)	
< 1	51 (51.0)
1-5	33 (33.0)
6-10	6 (6.0)
>10	10 (10.0)

Table 3: Profile of the of the common morbidities among the workers (n=59)

Morbidity	Workers (%)
Respiratory complaints	
Wheeze	5 (8)
Acute cough	16 (27)
Chronic cough	10 (17)
Haemoptysis	2 (3)
URT symptoms (rhinitis/sore throat/post nasal drip)	12 (20)
Eye complaints	
Foreign body in the eye	7 (12)
Watering of eye	8 (14)

59% reported any morbidity. Results are not mutually exclusive

Table 4: Physical examination of the workers

Variable and Findings	Workers (%)
Body mass index (n=100) (%)	
<18.4(Under weight)	31 (31.0)
18.5-22.9(Normal)	63 (63.0)
23.0-24.9(Over weight)	3 (3.0)
>25.0(Obese)	3 (3.0)
Pallor (n=50) (%)	
Male	4 (8.0)
Female	12 (24.0)
Skin (n=100) (%)	
Dry skin	4 (4.0)
Taenia Corporis	3 (3.0)
Insect bite marks	2 (2.0)
P. versicolor	2 (2.0)
Herpes labialis	1 (1.0)
Respiratory (n=100) (%)	
Upper respiratory tract infection	12 (12.0)
Lower respiratory tract infection	2 (2.0)

Personal hygiene: Most of the workers (96%) said they wash hands thoroughly with soap and water after days work. Seventy eight of them (78%) had regular daily bath. Eighty (80%) used footwear regularly but none used footwear at workplace.

Personal habits: Out of the 100 workers 67(67%) reported use of tobacco in any form. Five (7.5%) used smoking form, 57(85%-33 males and 24 females) used smokeless form and 5(7.5%) used both forms of tobacco. Out of 50 male workers 27% reported regular alcohol consumption.

Morbidity profile of workers: A total of 59 workers (59%) reported of having any health problem. Approximately half of them (48%) reported to have musculoskeletal pain, 27(27%) reported of having respiratory complaints like acute cough, chronic cough, rhinitis, sore throat etc, 19(19%) had complaint of frequent headache, 12(12%) complaint of skin problems like itching and rashes,8(8%) complaint of watering of the eye, foreign body in the eye, etc,. Five workers(5%) reported of sustaining an injury at the work place. Common mechanism of injury was brick falling on the hand while handling it. Details of the above mentioned self reported morbidities are given in Table 3.

Out of the 48 workers who complaint of musculoskeletal pain 34 (70.3%) complaint of lower back pain, 9 (18.7%) knees, 8 (16.7%) upper back, 7 (14.5%) shoulder, 5(10.4%) wrist, 4(8.3%) elbow and 4 (8.3%) neck and forearm pain. Out of the afflicted 26 (54.2%) reported having episodes everyday, 8 (16.7%) reported it being of severe degree and 3(6.3%) reported that it adversely interferes with their work.

On examination the mean systolic BP was 117±16mmHg and mean diastolic BP was 76±11mm Hg. However there were no known hypertensives. The mean body mass index (BMI) was 19.7± 2.84 Kg/m^2. As per ICMR classification 31% were underweight and 3% were obese. Sixteen (12 women and 4 men) had pallor on examination i.e. 24% of the women had pallor.

No other significant examination findings including the musculoskeletal system.

Peak Expiratory Flow Rate (PEFR) of all the workers was done using a Mini-Wright Peak Flow Meter which showed a mean peak expiratory flow rate of 323.60±84.654 L/min for the male workers and 322 ±78.662 L/min for the female workers. The PEFR values were interpreted using PEF EU Scale for Caucasian population and based on this 22 of the workers had a PEFR within the normal range (9 males and 13 females) and 78 of them had values below normal range (41 males and 37 females). However none of them were a known case of obstructive lung disease.

Table 5a: Morbidity by duration of work

Morbidity	N	Duration of work in Days (Mean± SD)	p value*
Musculoskeletal			
Absent	52	834.82 ± 1424.44	0.410
Present	48	1059.29 ± 1727.88	
Respiratory			
Absent	73	961.82 ± 1587.21	0.647
Present	27	890.51 ± 1563.71	
Duration of work		**PEFR (Mean± SD)**	
< 5Years	84	325.783 ± 81.1370	0.345
>5Years	16	303.571 ± 79.7696	

*Mann-Whitney U test applied for calculation of p value

Table 5b: Morbidity by job categories

Morbidity	Job category (%)			p value*
	Mixing/ Moulding	Loading/ Unloading	Others	
Respiratory				
Absent	61 (83.5)	10 (13.6)	2 (2.7)	0.489
Present	24 (88.9)	3 (11.1)	0	
Musculoskeletal				
Absent	47 (90.3)	4 (7.7)	1 (2)	0.251
Present	38 (79.1)	9 (18.7)	1 (2)	

*Fisher exact applied for calculation of p value

There was no statistically significant difference in the mean duration of work among those with musculoskeletal morbidity. The same was found between duration of work and respiratory morbidity and the PEFR values. No statistically significant difference in the respiratory or musculoskeletal morbidity was found between workers of different job categories.

In case of any ailment 91% of the workers went to a nearby health facility to seek health care.

Brick kiln and residential quarters walk through: Brick kiln walk through revealed increased risk for slips trips and falls with uneven mud floors, lack of designed walkways and narrow passages between work areas. There was no artificial lighting in the work area and the natural lighting was found to be inadequate. There was no first aid kit available in any of these factories. Fire extinguishers were present. There is no rotation of jobs but workers get adequate breaks between work for personal needs. There is use of mechanical aid like wheel barrows and trucks. Workers feel secure and there were no incidents of threat to property or life in any of these brick kilns.The workers were staying in multiple homes which were clubbed together each measuring approximately 8×10×12 cubic feet. There was overcrowding and lighting and ventilation was inadequate. Kitchen was inside the home which had no raised platform for cooking. Fire wood was used for cooking and there were signs of indoor air pollution. There were no sanitary latrines and the workers practice open air defecation. Source of water was bore well but the water was not checked for its portability.

DISCUSSION

The most common morbidities among the workers were musculoskeletal pain (ICD- 10 M79.1) (48%), underweight (ICD-10 R63.6) (31%), Respiratory morbidity (27%), frequent headache (ICD-10 G44.28) (19%), Pallor (ICD-10R 23.1) (16%), skin problems (12%) and eye complaints like foreign body in the eye, watering of the eye (ICD-10 T15.9) (8%). Other studies in similar settings have also identified respiratory and musculoskeletal morbidities as the most common among brick factory workers[1,14]. The long hours of working in a dusty environment added with bad posture while working puts the brick kiln workers at higher risk of such morbidities. Low back ache was the most common pain among the brick makers which is similar to other studies from West Bengal, Jharkhand, and Nigeria[8 -10]. This is probably due to repeated bending and twisting of the trunk which causes an enormous force generation at the lumbosacral segment of the vertebral column[11]. A significant proportion of our workers (31%) were undernourished which reflects their poverty and low economic status. This is likely to affect their productivity at work and further worsen the poverty.

In our study 78% had PEFR below the normal range. However none of these workers were a known case of obstructive lung disease. The statistical test of significance also did not show any significant association between the PEFR value and the respiratory morbidity. The possibility of an asymptomatic obstructive lung disease should be kept in mind and it is advisable to do periodic examination for this workers. But the interpretation of PEFR values using EU scale for Caucasian population is questionable and this brings us to the importance of having a standard scale for interpreting PEFR for Indian population.

Ninety-one (91%) workers reported that they seek health care from a nearby hospital if they or any of the family members fall ill. It is appreciable that they didn't follow the common trend of coming back home to seek treatment even for minor ailments which will result in loss of job and the earning[7].

Our study showed 82% of the workers had migrated from other states. Three of these migrant workers children were also employed in the brick kiln. The Indian brick industry is known to employ large numbers of migrant workers including men,

women and even children[14] which is a matter of great concern

A large number of workers (66%) reported of doing overtime work which can increase the risk of various morbidities. The reason might be that they earn money on the number of bricks they make, rather than hours of work, which encourages them to work from dawn till dusk. Only 2 out of 10 brick factories had provided PPEs and workers also did not use them because they found it uncomfortable to work with it. The prevalence of tobacco use in our study population was 67% which is much higher as compared to 30% in India and 21.9% in Karnataka[17]. Smokeless form of tobacco use was much higher than the smoking form. Working without the use of PPEs and substance abuse can further increase the risk of morbidities and decrease the productivity of these workers.

CONCLUSION

The most common morbidities among the brick factory workers were musculoskeletal pain, underweight, Respiratory morbidity, frequent headache, Pallor, skin problems and eye complaints like foreign body in the eye, watering of the eye. An improvement of working environment with focus on duration of work, nutrition of workers and residential quarters and enforcement of safety devices are needed in the factories studied. Pre-placement and periodic examination should be done to identify at risk individuals for common morbidities.

LIMITATIONS

The present study was a cross sectional study with a limited sample size and hence causality cannot be determined. Some categories of brick kiln workers like the firing workers could not be included in the study because of the seasonality of the work

RECOMMENDATIONS

A follow up study with a larger sample size would be appropriate. The factory owners should be encouraged to provide PPEs for the workers. Giving health education to the workers regarding the importance of regular use of PPEs, harmful effects of substance abuse, common morbidities and the probable preventive measures is the first step. We also recommend an improvement of working environment, residential quarters and enforcement of safety devices. Pre-placement and periodic examination should be done to identify at risk individuals.

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