

Prevalence of Musculoskeletal Discomfort among the Workers at Manual Brick Kiln Units

Neha Gahlot¹, Kusum Rana², Sudesh Gandhi³

Ph.D. Scholar, Department of Family Resource Management, CCSHAU, Hisar, Haryana, India¹

Associate Professor, Department of Family Resource Management, CCSHAU, Hisar, Haryana, India²

Senior Scientist, Department of Family Resource Management, CCSHAU, Hisar, Haryana, India³

ABSTRACT: Bricks are one of the essential building materials. In India, fired clay bricks are produced in conventional, unorganized small scale industries. Indian brick industry, the second largest brick producer in the world, is next to that of China. Brick kilns, is an unorganized sector, where the workers are recruited temporarily on a seasonal basis for the entire season of brick making. The workers have no experience and they are not provided with any training. This stressful situation can be made worse by physical discomforts in the workplace and causes occupational hazards. This particular study was conducted in Hisar city of Haryana state to find out the musculoskeletal discomforts and perceived exertion felt by the manual brick kiln workers.

KEYWORDS: Brick kiln unit, Women labourers, Musculoskeletal discomfort

I. INTRODUCTION

Brick kiln, being a small scale industry has a very important role in Indian economy. Brick is one of the most important building materials used in construction in India. The Indian brick industry, next to that of China, is the second largest producer of brick in the world. The brick industry in India falls into small scale and unorganized sector with more than one lac brick kilns spread throughout the country, with each unit manufacturing between 1 lac to 1 million bricks every year[1]. Brick kilns, is an unorganized sector, where the workers are recruited temporarily on a seasonal basis for the entire season of brick making. The workers have no experience and they are not provided with any training. Therefore, they do not have any previous knowledge about unsafe acts and hazards related to this work, awkward postures, or they simply ignore the safe working process. The common jobs in brick kilns comprise of pushing, pulling, bending, reaching, stretching, lifting, lowering, sitting, standing, walking and carrying, mining/rimming of clay, preparation of clay, molding of clay, drying of bricks, burning of bricks and the final product i.e. the brick. It was reported that the risk factors for developing work-related musculoskeletal disorders include individual factors (e.g. inadequate strength, poor posture), physical requirements at the workplace (e.g. work requiring high force, prolonged awkward static posture, highly repetitive work, use of vibrating tools), and organizational and psychosocial factors (e.g. prolonged work hours, poor work-rest cycle, shift work, low job security, little social support) [2]. It was reported that in the developing countries like India, brick kiln workers suffer from assorted health problems due to handling of heavy loads without taking adequate rest breaks. In addition, the unorganized workplace and type of work performed by the workers were some of the reasons for poor health conditions and injuries [3].

Workers complained about the activities causing pain and discomfort. All the workers who responded suffered from pain and discomfort in activities like mixing of clay, carrying load in a trolley and pushing the trolley. Nearly 81% of the workers felt pain during the moulding of bricks. Twenty eight (28%) of the respondents experienced pain while arranging the bricks for drying, while 88% of the workers reported significant pain and discomfort while loading bricks on to truck or tractor with trolley[4].

This study was planned with the objective to study the musculoskeletal discomfort felt by Brick kiln workers. Descriptive research method has been used for this study. Convenience sampling method was used to collect the data where 50 respondents were collected from each activity. The primary data was collected through well-constructed and

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pre-tested questionnaire along with Human body map Scale [5], and rated perceived exertion scale [6] from the respondents of Hisardistrict of Haryana state.

II. RELATED WORK

The industry has an annual turnover of more than Rs. 10,000 crores and it is one of the largest employment generating industries [7].

Work-related musculoskeletal disorders (WMSDs) have become a major problem in many industrialized countries including India. Manual brick manufacturing in India is currently an extremely hazardous occupation. In the developed countries some mechanization was introduced but various studies show that the workers working in the brick manufacturing units suffer from musculoskeletal problems[8].

Study conducted in Karnataka district on 60 workers highlighted that jobs in brick kilns involve a very wide range of physical actions from postures and positions that may not be ideal and could place workers at risk for accidents and injuries. This stressful situation can be made worse by physical discomforts in the workplace and cause MSDs. The prolonged stress and strain caused during the various activities with different load conditions is a cause for work related MSDs [9].

III. MATERIALS AND METHODS

Work-related musculoskeletal disorders (WMSDs) have emerged as a major health problem among workers in the developing countries. Working at the ground level with a high degree of flexed posture clearly constitutes a health risk for the musculoskeletal system [10]. Many episodes of low back pain are disabling, thus making it one of the costly occupational health problem.

Musculoskeletal problems: Work related musculoskeletal disorders by definition are a subset of musculoskeletal disorders that arise out of occupational exposures. These are a group of painful disorders of muscles tendons, and nervous. The musculoskeletal discomfort of the brick kiln workers were assessed by the following parameters:

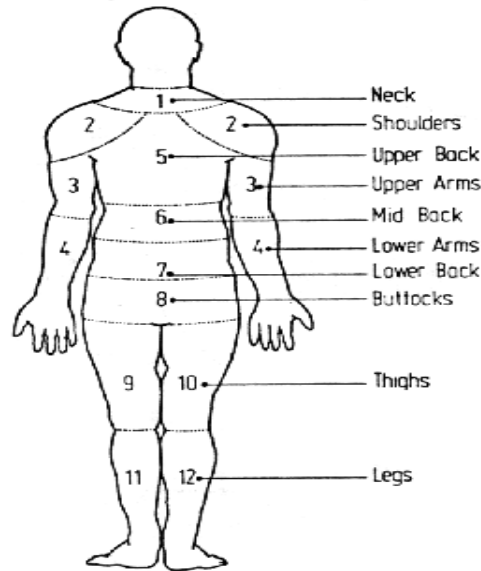
Human Body map: Fig 1 shows the human body map technique. It was used to measure the localized discomfort, musculoskeletal discomfort and intensity of pain in different body parts resulting from postural discomfort. Body part discomfort score (BPDS) was obtained using human body map. Using this technique, the body was divided into a number of regions. After a bout of work, the subjects were asked to indicate body parts that were most painful. After noting these, the next painful parts were asked and so on till the workers indicated no further parts. In this scale, scores were assigned at 5-point continuum ranging from 1-5 *i.e.* very light exertion (1), light exertion (2), moderate heavy exertion (3), heavy exertion (4), and very heavy exertion (5). The weighted mean score was derived to reach at the conclusion[5].

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A Technique for Assessing Postural Discomfort



Body regions.

Fig 1: Human body map

Rating of perceived exertion (RPE scale)

The RPE was used to measure the intensity of exertion. It is subjective expression of feelings of workers towards the activity *i.e.* how easy or difficult the subject finds his activity. It is based on physical sensation a person experiences during an activity including increased heart rate, increased sweating and muscle fatigue. This scale now has been accepted as a practical method for rapid appraisal of all occupational work. In this scale, scores were assigned at 5-point continuum ranging from 1-5 *i.e.* very light exertion (1), light exertion (2), moderate heavy exertion (3), heavy exertion (4), and very heavy exertion (5). The weighted mean score was derived to reach the conclusion [7].

IV.RESULTS

Table 1 shows the discomfort score felt by the brick kiln workers in different brick making activities. There were 5 different activities performed by the workers for brick making. Each worker was performing different activity which was not overlapped. The human body map was used to identify the localized discomfort and pain in the particular body part due to the brick making activity. Different body part discomfort scores were summarized and it was found that activity 4 Nikasi, got first rank and scored 2.72. In this activity, the baked brick workers take out the bricks manually on wooden trolley where a forward inclined posture needs to be maintained to push the trolley forward. Earlier unloading and shipping process of sand may produce a lot of dust and particulate matter pollutants that come from the surface of the bricks and have the same chemical components as brick itself. Additionally, work exposure to the high temperature and the high density dust and particulate matter over a long time can result in occupational health problems, including serious disease [11].

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Table 1: Body discomfort score of the brick kiln workers in different brick making activities (N=50)

S.N.	Body Parts	Activity 1 (Pather)	Activity 2 (Bharai)	Activity 3 (Beldar)	Activity 4 (Nikasi)	Activity 5 (Jalai)
1	Neck	1.6 ± 0.51	1.2 ± 0.42	2.3 ± 0.48	2.7 ± 0.67	1.6 ± 0.51
2	Shoulder joint	1.6 ± 0.51	1.7 ± 0.48	2.2 ± 0.63	2.6 ± 0.51	2 ± 0.47
3	Upper arms	2.6 ± 0.51	1.7 ± 0.67	2.4 ± 0.51	2.3 ± 0.48	2.4 ± 0.51
4	Lower arms	2.8 ± 0.42	1.1 ± 0.31	2.3 ± 0.48	2.6 ± 0.51	2.3 ± 0.48
5	Wrist	3.1 ± 0.56	1.4 ± 0.51	3.4 ± 0.51	2.6 ± 0.63	2.1 ± 0.56
6	Palm	3.5 ± 0.52	1.1 ± 0.31	2.2 ± 0.42	3.2 ± 0.56	1.6 ± 0.51
7	Upper back	2.5 ± 0.52	1.6 ± 0.51	2.7 ± 0.67	3.1 ± 0.42	2 ± 0.66
8	Lower back	3.1 ± 0.56	1.5 ± 0.52	2.8 ± 0.78	3.2 ± 0.51	2.7 ± 0.48
9	Thigh	2.9 ± 0.73	1.1 ± 0.31	1.8 ± 0.63	2.4 ± 0.51	1.7 ± 0.48
10	Knee	2.7 ± 0.67	1 ± 0	2.6 ± 0.69	3 ± 0.51	1.7 ± 0.48
11	Calf muscle	2.3 ± 0.48	1.2 ± 0.42	2.4 ± 0.51	2.6 ± 0.51	1.6 ± 0.51
12	Ankle/feet	1.7 ± 0.48	1 ± 0	2.9 ± 3.2	2.4 ± 0.51	1.5 ± 0.52
Average Body Discomfort score		2.53	1.30	2.50	2.72	1.93
Ranking		II	IV	III	I	V

Pather activity got 2.53 discomfort score and ranked second followed by activity 3 where workers arranged the bricks into kiln for baking.

Results of Table 2 summarize the perceived exertion felt by the brick kiln workers during the particular activity performed. It was found that activity 4 Nikasi got 4.8 score and ranked first and perceived as heavy activity by the workers followed by pather 4.4 and jalai 4. Similar results revealed that transportation of the bricks was done manually with 9 to 12 bricks carried at one time on head. Carrying load on head regularly caused health problems [12].

Table 2: Rated Perceived exertion score for different brick kiln activities (N=50)

S.N	Activity	Mean score ± S.D.	Rank	Activity type
1	Activity 1 (Pather)	4.4	II	Heavy
2	Activity 2 (Bharai)	3.1	V	Moderately heavy
3	Activity 3 (Beldar)	3.6	IV	Moderately heavy
4	Activity 4 (Nikasi)	4.8	I	Heavy
5	Activity 5 (Jalai)	4	III	Heavy

Therefore it is clear from Table 2 that Nikasi was found to be a heavy activity securing first rank. This activity is performed manually with the help of wooden *reda*.

V. CONCLUSIONS

The results of the study showed that the brick kiln workers were suffering from musculoskeletal discomfort as the activities require the labourers to work in very uncomfortable position. The prolonged working hours contribute to increase the rate of discomfort among brick kiln workers. It can be concluded that the activity 4 Nikasi where workers

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load 60-70 bricks at a time is the most difficult and discomfort prone activity followed by Pather activity where bricks are shaped through moulds. Pain is the most common symptom associated with WMSDs. In some cases there may be joint stiffness, muscle tightness, redness and swelling of the affected area. Some workers may also experience sensations of “pins and needles”, numbness and skin colour changes. Work related musculoskeletal disorders develop slowly over months and year of repeated stress. The risk factor themselves are universal, found in most jobs. If ignored, musculoskeletal disorders can result in lifelong pain and permanent disability.

REFERENCES

- [1] Saidapur, S., “Informal Brick Industry in the North Karnataka- Flourish or Perish”, *ArthPrabhand: A Journal of Economics and Management*, Vol. 1, no. 8, pp 87-97, 2012
- [2] Marras, W., Knapik, G. and Ferguson, S., “Lumbar spine forces during maneuvering of ceiling-based and floor-based patient transfer devices”, *Journal of Ergonomics*, Vol. 52, no. 3, pp 384-397, 2009
- [3] Mukhopadhyay, P., “Risk factors in manual brick manufacturing in India”, *HFESA Journal, Ergonomics Australia*. Vol. 22, no. 1, pp 16–25, 2008
- [4] Manoharan.P.K, Singh.B.K, Sanjay Kumar Jha., “Ergonomic investigation using psycho-physiological study for brick kilns’ in Jharkhand, *International journal of Environmental Sciences*, Vol. 2, no. 3, pp 1484-1491, 2012
- [5] Corlett, N. E. and Bishop, R.P., “A technique for assessing postural discomfort”, *Ergonomics*, Vol. 19, pp 175-182, 1976.
- [6] Varghese, M.A., Saha, P.N. and Atreya, N., “A rapid appraisal of occupational work load modified scale of perceived exertion. *Ergonomics*, Vol. 37, no. 3, pp 485-491, 1994
- [7] Khan R and Vyas H., “A study of impact of brick industries on environment and human health in Ujjain city (India), *Journal of Environmental Research and Development*, Vol. 2, pp 421-425, 2008
- [8] Haslam R.A and Trevelyan F.C., “Musculoskeletal disorders in a handmade brick manufacturing plant, *International Journal of Industrial Ergonomics*, Vol. 27, pp 43-55, 2001
- [9] Qutubuddin S.M., S.S. Hebbal& A.C.S. Kumar. 2013. Ergonomic evaluation of tasks performed by workers in manual brick kilns in Karnataka, India, *Global Journal of Researches in Engineering*, Vol. 13, no. 4, pp 34-42, 2008
- [10] King, S.H. and Chung, M.K., “Effect of postural weight and frequency on trunk muscular activity and fatigue during repetitive lifting tasks”, *Ergonomics*, Vol. 38, no. 5, pp 853-863, 1995.
- [11] Spies, A and Naicker, N. 2006. “Pilot study to determine the extent and nature of occupational exposure to airborne pollutants associated with clay mining and brick-making”. National Institute for occupational Health, Vol. 2, no. 4:75-81
- [12] Iqbal, M.J., “Bonded labour in brick kiln industry of Pakistan”. *The Lahore Journal of Economics*, Vol. 11 (1), pp 99-119, 2006