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Musculoskeletal Symptoms among the Brick Kiln Workers of Kathmandu Valley – A Cross Sectional Study

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Abstract

Background: Brick kilns may pose threat to the environment and health of the workers and people residing around them. Health problems related to brick kilns are musculoskeletal, respiratory, digestive system, nutritional and skin disorders. Objective of this study was to find out the prevalence of musculoskeletal symptoms (problems) among brick kiln workers of Kathmandu valley.

Methods: A cross sectional study was conducted in the brick kilns of Kathmandu valley from February to April 2015. Two hundred (200) workers were selected randomly from the sampled brick kilns of Kathmandu Valley as the exposed group and the equal number of grocery vendors from the surroundings of the brick kilns was included as the control group in term of exposure to ergonomic hazards. The data was collected using Nordic Musculoskeletal Questionnaire.

Results: A majority of the respondents were Hindu by religion. The mean age of exposed group was 30.75 years and 33.25years for control group. Male female ratios were 2.39:1 and 1.94:1 in exposed and control groups respectively. The highest prevalence of musculoskeletal problem was found on Shoulders followed by Lower back, Knee and Neck for exposed group.

Conclusion:

All musculoskeletal problems were significantly different between exposed and control groups. Compared to the control groups, brick kiln workers had almost 8 times more likely to experience shoulder problem and 7 times more low back pain.All musculoskeletal symptoms at any time during last 12 months were found higher in exposed group compared to the control group, which was statistically significant.

Key words: Brick kilns, Environment, Musculoskeletal, Workers

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Introduction

Bricks are one of the most important building materials used in Nepal. Almost all the buildings in Nepal use bricks as a major building material. Brick kilns in suburban areas pose a big threat to the environment and health of workers and people residing around them.

In the developing countries, brick kilns pose an increased threat to the environment and health of workers and people in surrounding areas.[1,2,3] Health problems related to brick kilns are musculoskeletal, respiratory, digestive system, nutritional and skin disorders. Occupational exposure to dust may cause respiratory diseases.[2,4,5]

Work related musculoskeletal (MSK) symptoms are one of the major health concerns for brick kiln workers. The MSK symptoms describe a wide range of inflammatory and degenerative diseases and disorders.[6-10] These conditions result in pain and functional impairment affecting the neck, shoulders, elbows, forearms, wrists, and hand.[7,11] Moreover, daily work activities and work conditions significantly contribute to their development or exacerbation.[6,7,11] In addition, awkward posture such as squatting posture while forming bricks and carrying heavy loads resulted in a large number of brick kiln workers complaining of pain in different body parts namely, 50% of low back pain, 38% of neck pain and 29% of shoulder pain.[12]

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A study conducted in hand made brick factory, especially on the molding station has been a general indication that working with bricks may dispose towards upper limbs and back disorders. Posture and force analysis found poor standing posture and undesirable wrist positions, accompanied by significant force loadings. An important contributory factor was considered to be the piece work system. Also dealing with the brick layers, it was found that MSK complaints decreased with length of employment.[13] Further investigation revealed that this was most likely due to a "healthy worker effect" where individuals susceptible to MSK complaints leave the trade, leaving their more resilient colleagues in the work force. A study evaluating lifting tasks during firing, forming, heating and packing processes showed that weight of the load significantly influenced the incidence of back injuries and that workers who reported to have experienced back injuries were older than those who did not experienced them.[14] Similarly, it was observed that workers are adapted to squatting posture while making bricks and they carry loads weighing 12-40 kg at a time, which is much more than the recommended weight limit.[12] Due to that a large number (81%) of workers complained of pain in different body parts. The main complaints concerned were low back pain (50%), neck pain (38%) and shoulder pain (29%). The workers' body mass index reveals that 28 % of them suffered from chronic energy deficiency.

The objective of this study was to find prevalence of musculoskeletal symptoms (problems) among brick kiln workers of Kathmandu valley.

Methods

This was a cross sectional analytical study design. The study was conducted in the brick kilns in Kathmandu valley that includes three densely populated cities; Kathmandu, Lalitpur and Bhaktapur. Two hundred workers were selected randomly from the sampled brick kilns in Kathmandu Valley and the equal number of grocery vendors from the surroundings of the brick kilns was included in the study. The probability proportionate to size (PPS) sampling technique was applied to select brick kiln workers and grocery workers. Brick kiln workers were taken as the exposed group and the grocery vendors were taken as the control group in term of exposure to ergonomic hazards. The data collection was carried out during February to April 2015 using NORDIC questionnaire for musculoskeletal systems. Ethical clearance was taken from the Institutional Review Committee of Kathmandu Medical College.

Results

Among 200 exposed respondents, 50% were from Bhaktapur district, 37.5% from Lalitpur district and 12.5% from Kathmandu district. Similarly, among the control respondents, 50% were from Bhaktapur district, 37.5% from Lalitpur district and 12.5% from Kathmandu district.

Table 1: Socio-demographic information

Variable		Exposed (%)	Control (%)
Age group	< 20	47 (23.5)	5 (2.5)
	20-29	63 (31.5)	73 (36.5)
	30-39	39 (19.5)	84 (42)
	40-49	35 (17.5)	31 (15.5)
	50-59	11 (5.5)	6 (3.0)
	60-69	4 (2.0)	1 (0.5)
	≥70	1 (0.5)	0 (0.0)
Gender	Female	59 (29.5)	68 (34.0)
	Male	141 (70.5)	132(66.0)
Birthplace	Within district	10 (5.0)	126 (63.0)
	Outside district	101 (50.5)	73 (36.5)
	India	89 (44.5)	1 (0.5)
Caste	Brahmin / Chhetri	14 (7.0)	58 (29.0)
	Madhesi other caste	34 (17.0)	9 (4.5)
	Dalit	87 (43.5)	4 (2.0)
	Newar	13 (6.5)	107 (53.5)
	Janajati	48 (24.0)	22 (11.0)
	Muslim	4 (2.0)	0(0.0)
Literacy	Literate	85 (42.5)	191 (95.5)
	Illiterate	115 (57.5)	9 (4.5)
Marital status	Married	146 (73.0)	164 (82.0)
	Unmarried	52 (26.0)	35 (17.5)
	Separated male	1 (0.5)	0 (0.0)
	separated female	1 (0.5)	1 (0.5)

Table 2: Musculoskeletal symptoms at any time during last 12 months

Musculoskeletal problem at any time during last 12 months	Exposed		Control		Odds Ratio	95% CI
	Yes (%)	No (%)	Yes (%)	No (%)		
Neck	123 (61.5)	77 (38.5)	48 (24.0)	152 (76.0)	5.06	3.3-7.8
Shoulder	136 (68.0)	64 (32.0)	41 (20.5)	159 (79.5)	8.24	5.2-12.9
Elbow	56 (28.0)	144 (72.0)	17 (8.5)	183 (91.5)	4.19	2.3-7.5
Wrist/hand	103 (51.5)	97 (48.5)	46 (23.0)	154 (77.0)	3.55	2.3-5.5
Upper back	78 (39.0)	122 (61.0)	16 (8.0)	184 (92.0)	7.35	4.1-13.2
Upper back	52 (26.0)	92 (46.0)	6 (3.0)	138 (69.0)	7.17	3.4-15.0
Lower back	135 (67.5)	65 (32.5)	83 (41.5)	117(58.5)	2.93	1.9-4.4
Hips/ thighs	60 (30.0)	140 (70.0)	19 (9.5)	181 (80.5)	4.08	2.3-7.2
Knees discomfort	125 (62.5)	75 (37.5)	81 (40.5)	119 (59.5)	2.45	1.6-3.7
Ankles/ feet	88 (44.0)	112 (56.0)	26 (13.0)	174 (87.0)	5.26	3.2-8.6

A majority (>90 %) of the respondents were Hindu by religion. The mean age of exposed group was 30.75 years and 33.25 years for control group (Table 1).

Ninety five percent (95%) of brick kiln workers were from outside Kathmandu valley, and among them 44.5% were from India. 43.5% of workers were belonging to Dalit caste and 24% were belonging to Janjati Caste. Majority (57.5%) of the workers was illiterate. 73% and 82.5% of respondents were married among exposed and control group respectively.

All Musculoskeletal symptoms in neck, shoulder, elbow, wrist, upper back, lower back, hips, knees and ankles at any time during last 12 months were found higher in exposed group compared to the control group which were also statistically significant. Compared to the control groups, brick kiln workers had almost 8 times more likely to experience shoulder problem and 7 times more low back pain. Ankles/ feet was likely to experience 5 times more discomfort in brick kiln workers compared to control group. Elbow and Hip/thigh pain/ discomfort were almost five times more likely to experience discomfort whereas, wrist pain/discomfort 3.5 times more likely to experience discomfort by the brick kiln workers (Table 2).

Discussion

In this study, the prevalence of neck musculoskeletal symptoms among brick kilns workers was 61.5% and among grocery workers was 24.0%. This finding was higher than the study conducted in Nepal, where it was 52.1% for brick kiln workers and only 4.7% for control participants.[15] The prevalence of neck musculoskeletal symptoms in brick kiln workers in other studies were from 26.0-72.0%.[8,16,17] Similarly, the prevalence of shoulder musculoskeletal symptoms among brick kiln workers was 68.0% and among control group was 20.0% in our study. In another study, the prevalence of shoulder musculoskeletal symptoms/illnesses among brick kiln workers was 42.5% and just 1.6% for the reference group.[15] Similarly, in few other studies, the prevalence of shoulder problem ranged from 15.8-77.8%.[8,17] Alike, elbow musculoskeletal symptoms were experienced by 28.0% of exposed and 8.5% of control group. In a similar type study in Nepal, the prevalence of elbow discomfort among brick kiln workers was 34.2% and among reference participants it was only 3.1%.[15] Likewise, the prevalence of wrists/ hands musculoskeletal symptoms/illnesses was 51.5% for exposed and 23.0% for reference participants. In a study by Joshi et al., the prevalence of wrists/hands discomfort for exposed was 38.4% and for reference subjects was 3.1%.[15] The previous studies divulged that the prevalence of brick kiln workers' wrists/ hands musculoskeletal symptoms/illnesses were from 16.0-62%.[8,16,17] In this study, the prevalence of upper back musculoskeletal symptoms/illnesses exposed was 26.0% and for control participants was 3.0%. In a previous study in Nepal, prevalence of upper back discomfort for exposed was 54.8% and for reference population was 75.0%.[15] In brick kiln workers studies upper back musculoskeletal symptoms/illnesses ranged from 21.0-77.8%.[8,17] In the same way, the prevalence of lower back musculoskeletal symptoms/ illnesses was 67.5% for exposed and 41.5% for control participants in our present study. Similar study in Nepal found the prevalence of lower back musculoskeletal symptoms/illnesses for exposed was 54.8% and for reference was nil.[15] In other studies in brick kiln workers, the prevalence was from 26.0-90.0%.[8,16,17,18] Similarly, the hips/thighs musculoskeletal symptoms/ illnesses was prevalent among 30.0% exposed

and 9.5% control participants. In the similar study in Nepal, prevalence of hips/thighs discomfort for brick kilns workers was 50.7% and for reference group was 41.7%.[15] In the studies from Botswana on brick kiln workers, the prevalence of hips/thighs discomfort ranged from 5.0-51.0%.[8,17] Alike, the prevalence of knee musculoskeletal symptoms/illnesses was 62.5% for exposed and 40.5% for control group. In a study by Buckle et al. the prevalence of knee discomfort for exposed was 68.2% and for reference group was 69.2%.[10] Other studies revealed the prevalence of knee musculoskeletal symptoms/illnesses ranging from 45.0-57.0%.[8,18] Also, in present study the ankles/feet musculoskeletal symptoms/illnesses were prevalent for 44.0% exposed and 13.0% control participants. In a similar type study in Nepal, prevalence of ankles/feet discomfort for exposed was 60.3% and reference group was nil.[15] In a study conducted in India among brick workers who had discomfort in different body parts, 20.0% of neck, 25.0% of shoulder, 43.0% of arms, 56.0% of wrists, 40.0% of upper back, 90.0% of lower back, 2.0% of knees and 2.0% of legs/feet prevented normal work within last one year.[16] In another study, up to 31% of cases among manual workers could have been prevented excess morbidity among manual workers.[19]

In this study, among body parts musculoskeletal symptoms/illnesses, red brick loaders/carriers followed by coal crushers/carriers had the high prevalence of upper and lower back problems. Shoulder, neck and back were the most affected part for all the workers. Because all workers either carried a heavy load or remain in awkward posture for long duration and repeat the same task again and again, as a result they had a high prevalence of shoulder, neck and back discomforts.[20,21,22] Similar to our study, in a previous study conducted in India it was found that among the body parts of brick kilns workers, lower back, shoulder and neck was the most affected among all groups (brick carriers, brick molders, brick fire masters and brick stackers) of brick kiln workers.[23]

Postural discomfort in brick kilns have high risk of body discomfort, because they do hard work like lifting heavy loads, risk of shock and they use hard material and reported high pain in legs and thighs because they make brick in sitting positions.[24] Physical work exposures, such as repetitive and forceful movements, are an important source of risk and in particular account for a large proportion of excess morbidity among manual workers.[19] In the current study, brick industry workers were almost two times more likely to experience pain of body parts compared to reference group. The chance of body pain or discomfort was about nine times more for the brick kiln workers, which was in the same notion but more than four times higher than that of current study.[12] Ergonomics disorders happened because of presence of various ergonomic hazards like improper designing of tools, workplace, manual material handling, lifting and lowering the load.[22] All musculoskeletal problems were significant higher among the exposed population compared to the control group. To reduce these problem, proper education must be given to the target population.

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