

Research Paper :

Assessing and preventing self-reported work-related musculoskeletal disorder of workers in brick making factories

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ABSTRACT

The main aim of this study was to investigate the self-reported work-related musculoskeletal disorders by male and female workers during individual raw brick making activities and to analyse the causes of discomfort related to various postures adopted by the workers. Twenty male and 20 female workers from raw brick making unit were randomly selected and a detailed work related musculoskeletal pain/discomfort were analysed in different activities with the revised Nordic Questionnaire. All the selected workers had given their responses, which were analyzed. It was reported that 100 per cent of the respondents complained pain in digging and crushing clay activities. Thirty per cent of males and nearly 38 per cent females *i.e.* approx 68 per cent respondents said that the activity of wetting clay caused the pain. All the respondents suffered from pain and discomfort due to mixing clay, carrying clay, loading and pushing wheelbarrow caused to almost all the workers of the brick making unit. On the other hand, nearly 33 per cent of males and 40 per cent of females felt the pain while shaping the bricks. Majority of the respondents were feeling pain and discomfort in different body parts. It was also observed that the workers work continuously in awkward postures during certain raw brick making activities. Consequently they may suffer from discomfort in different parts of the body. Even mostly they were from middle generation and were felt the musculoskeletal pain/discomfort in different body parts.

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Work-related musculoskeletal disorders (WMSDs) have become a major problem in many industrialized countries (Hagberg *et al.*, 1995) including India. These disorders have caused a considerable human suffering and are also economically very costly, because of reduced working capacity and lessened production. High incidence rate for WMSDs of the upper extremities have been reported for workers in office work, manufacturing and agriculture which includes numerous material handling occupation in various factories (Faucet *et al.*, 2002).

The scientific committee for Musculoskeletal Disorders of the International Health (ICOH) recognizes WMSDs which describe a wide range of inflammatory and degenerative disease, and disorders that result in pain and functional impairment (Kilbome *et al.*, 1996) and may affect the body's soft tissues, including damage to the tendons, tendon sheaths, muscles and nerves of hands, wrists, elbows, shoulders, neck and back. The conditions for these regions are collectively referred to as the neck and upper limb musculoskeletal disorder (Saldana, 1996).

Brick factory workers are mainly involved in different factory activities related to brick making. Most of those workers come from poor socio-economic conditions. They are compelled to perform brick making activities with the family members so that they can earn money to help their families.

The workers mainly perform the following activities: digging and crushing clay, wetting clay, mixing clay, loading and pushing the wheelbarrow, shaping raw bricks, arranging bricks to dry, loading bricks on to the truck, tractor, and cycle or on others. To carryout such activities, workers most often have adopt awkward postures for a longer period *i.e.* near about 12 hours that result in musculoskeletal pain/discomfort affecting different body parts and have a poor body mass index.

In this study, an attempt has been made to correlate workers discomfort with their activities and year of working.

METHODOLOGY

For this study, 5 brick factories, which were 20 per

cent of the total factories, were purposively selected for the present study in the Pura block of Faizabad district in Uttar Pradesh, India and simply purposive and random sample was used to select the study area and workers. For descriptive data, sample size of 40 (20 male and 20 female) was selected which was 8 per cent of the total population. Most of the male and female workers were from 31-45 years of age and they were performing the raw brick making task more than 11 hours per day.

A study based on a modified Nordic Musculoskeletal Disorder Questionnaire was performed. The questionnaire consisted of a series of objective questions with 'yes' or 'no' response and some were in multiple choice questions. To investigate discomfort, it included detailed questions on work-related pain in different body parts. Work related pain/discomfort was reported in 12 month, one month and prevalence in 7 days. The participants were interviewed about any kind of discomfort affecting different body parts during every activity associated with raw brick making task and their health surveillance was also analysed.

FINDINGS AND DISCUSSION

The findings obtained from the present study as well as relevant discussion have been summarized under following heads:

Assessment of work-related Musculoskeletal disorders:

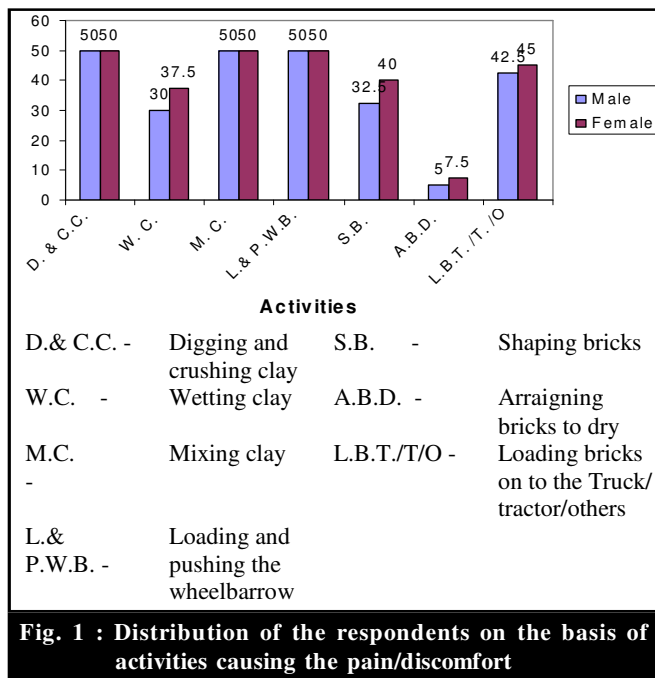
The work-related musculoskeletal problems and the body pain perceived by the workers were determined by administering of standardized Nordic questionnaire. All the selected workers had given their responses, which were analyzed.

Table 1 clearly envisages that total 20 per cent respondents were having knowledge about the musculoskeletal pain/discomfort. Nearly 78 per cent reported that they prevented themselves from normal activities and more than 50 per cent said that they stay away from normal work activities because of the pain/discomfort.

When asked about the activities causing pain and discomfort, it was reported that 100 per cent of the respondents complained pain in digging and crushing clay

activities. Whereas 30 per cent of males and nearly 38 per cent females *i.e.* approximately 68 per cent respondents said that the activity of wetting clay caused them pain.

All the respondents suffered from pain and discomfort due to mixing clay, carrying clay, loading and pushing wheelbarrow caused to almost all the workers of the brick making unit (Fig. 1). On the other hand, nearly 33 per cent of males and 40 per cent of females felt the pain while shaping the bricks. Approximately 13 per cent



of the respondents said that they had pain while arranging the bricks to dry. It was reported by total 87 per cent of the workers that loading the bricks on truck/tractor/on others caused the significant pain and discomfort.

Self-reported pain/discomfort:

Workers were asked few questions about perceived pain/discomfort, which lasted, for at least 24 hours. Pain was measured for past 12 months, last month and for 7 days. Majority of the respondents were feeling pain and discomfort in different body parts.

Sr. No.	Questions	Male	Female	Total
1.	Do you know about musculoskeletal pain/discomfort?	5 (12.5)	3 (7.5)	8 (20)
2.	Have you ever been prevented from normal work activities because of musculoskeletal pain/discomfort?	14 (35)	17 (42.5)	31 (77.5)
3.	Do you stay away from your normal activities because of the pain/ discomfort?	9 (22.5)	12 (30)	21 (52.5)

Values in parentheses indicate percentage

Prevalence of 12 month musculoskeletal pain/discomfort:

During the last 12 months, cent per cent of the respondents had pain and discomfort in neck and both shoulders. When asked about pain in elbow, 10 per cent of the respondents had pain in right elbow, whereas 32 per cent of males and 35 per cent of females had complained pain in both elbow. All selected male and female respondents reported pain in wrist, upper back and low back.

Almost 95 per cent respondents comprising 45 per cent males and 50 per cent females complained pain in hips/thighs. Concerning pain in knees, ankle/feet all respondents *i.e.* total number of male and female reported pain and discomfort (Fig. 2).

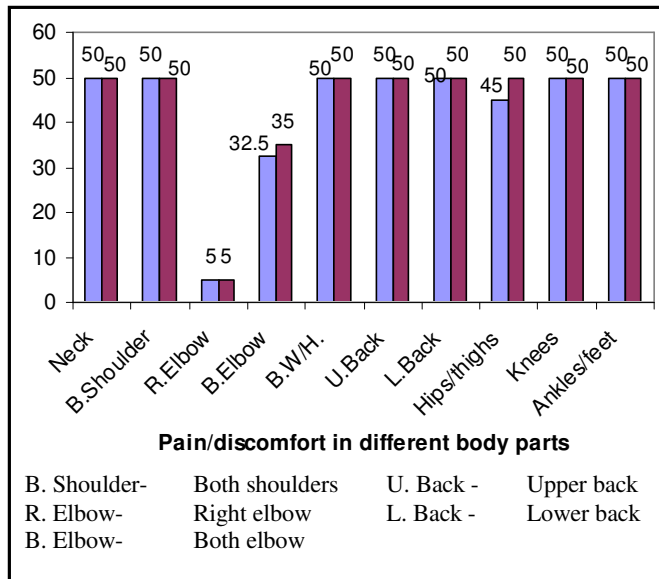


Fig. 2 : Distribution of the respondents on the basis of prevalence of 12 months musculoskeletal pain/discomfort

Prevalence of one month musculoskeletal pain/discomfort:

Regarding pain and discomfort, during last month total of 90 per cent of respondents, *i.e.* 40 per cent males and 50 per cent females complained neck pain. Concerning pain in both shoulders, all of the employees reported discomfort. On the other hand, nearly 18 per cent respondents, 10 per cent male and 7.5 per cent female complained pain in right elbow, whereas nearly 28 per cent of males and 35 per cent females, *i.e.* nearly 63 per cent respondents reported pain in both elbow (Fig. 3).

Majority of the respondents complained wrist/hand pain. Studies clearly showed that all the males and females respondents said that they had pain in upper and lower back last one month. Total 85 per cent respondents (40

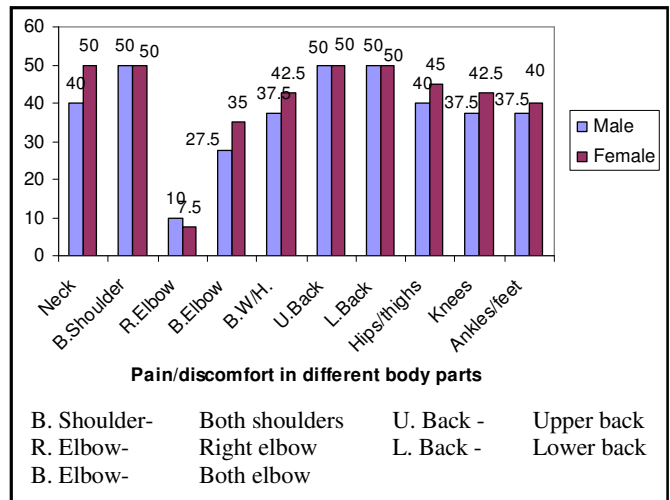


Fig. 3 : Distribution of the respondents on the basis of prevalence of 1 months musculoskeletal pain/discomfort

per cent males and 45 per cent females) suffered from the hips and thighs pain. On the other hand, approx 38 per cent males and 43 per cent females reported the pain in knees. Nearly 38 per cent males and 40 per cent females reported pain in ankles/feet lasted in 12 hours (Fig. 3).

Prevalence of seven days musculoskeletal pain/discomfort:

Further, all the males and female’s employees reported pain on neck and both shoulders during last 7 days. Nearly 18 per cent respondents, in which 8 per cent males and 10 per cent females had right elbow pain, whereas approx. 48 complain pain in both elbow (Fig. 4).

About 43 per cent males and all females, *i.e.* nearly 93 per cent employees suffered from wrist/hand pain.

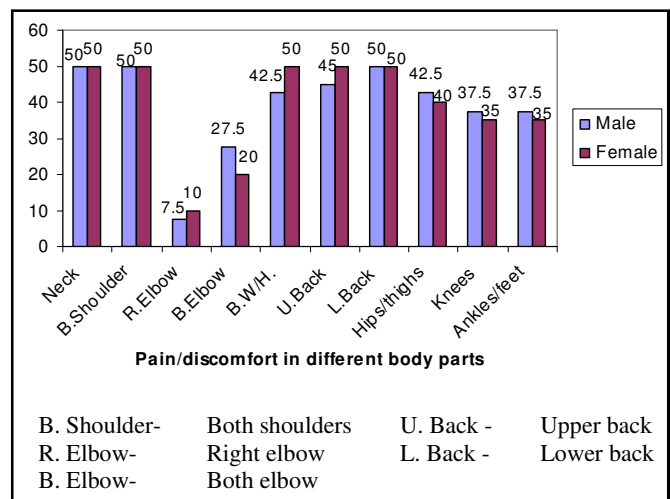


Fig. 4 : Distribution of the respondents on the basis of prevalence of 7 days musculoskeletal pain/discomfort

Forty five per cent males and all females complained of the upper back pain, whereas all selected respondents had low back pain. Total 83 per cent respondents, 43 per cent of males and 40 per cent of females reported pain in hips/thighs and same number of male and female respondents nearly 73 per cent suffered from knees and ankle/feet pain.

Data of Table 2 reveal that nearly 8 per cent females first notice the problem before working in factory. Of about 50 per cent males and 42.5 per cent females showed that they first noticed the musculoskeletal problem while working in factory. With regard to medical treatment, all employees were taking medical treatment when they needed and also all male and female respondents reported that they were taking the treatment from the factory medical not from personal doctor, self and others.

Responses regarding the problems for which they take the treatment showed that 50 per cent each males and female respondents took the treatment for headache; whereas all selected respondents agreed that they took

the treatment also for bodyache, cut and wounds, cold/ cough.

More than half of the total respondents in which 35 per cent males and nearly 33 per cent females were taking the treatment for irritation in eyes. About 78 per cent total respondents agreed that they were taking the treatment for stiffness in joints. It was found that 45 per cent males and approx. 43 per cent female respondents were taking the medical treatment for burning sensation in fingers. Nearly 38 per cent males and 33 per cent females were taking the treatment for pain in palm. Of all the employees, 65 per cent indicated that they took the medicine for forearm pain, in which 35 per cent were males and 30 per cent were female respondents. With regard to pain in cuff muscles, nearly 38 per cent males and 40 per cent females, total nearly 78 per cent respondents had taken the treatment for the same. It was found that total 30, 15 male and 15 female in number had agreed that they have taken the treatment for numbness in finger. Nearly 73 per cent of the total respondents, 40 per cent males and 33 per cent female workers also took the treatment for pain in trunk.

More than half of the total respondents *i.e.* nearly 63 per cent took the treatment for backache, in which 30 per cent were males and approximately 33 per cent were female respondents. Nearly total 68 per cent respondents agreed that they took the treatment when they suffered from shoulder pain. Total 85 per cent respondents said that factory treatment helps to reduce their health problem. In male category, it was reported by 40 per cent of the workers and in female 45 per cent respondents reported the same.

Hypothesis :

H_0 : There exists no relationship between type of activity and musculoskeletal pain/discomfort.

H_1 : There exists relationship between type of activity and musculoskeletal pain/discomfort.

The chi square values (Table 3) showed that the musculoskeletal pain/discomfort was found to be dependent on the digging clay, loading and pushing wheelbarrow, shaping and loading bricks. Hence, the Null hypothesis is rejected and alternate hypothesis is accepted.

In brick manufacturing industries, studies have been conducted which showed a general indication that working with bricks may dispose towards upper limb disorders. In a study Trevelyan and Haslam (2001) investigated musculoskeletal disorders in a handmade brick factory, concentrating on the 'moulding' department, where clay is shaped in to bricks. Results identified both upper limb

Table 2 : Health surveillance of factory workers (n-40)

Sr. No.	Question	Male	Female	Total
1.	First notice the problem			
	Before working in factory	-	3 (7.5)	3 (7.5)
	While working in factory	20 (50)	17 (42.5)	37 (92.5)
2.	Take the medical treatment	20 (50)	20 (50)	40 (100)
3.	Take the treatment from			
	Factory medical doctor	20 (50)	20 (50)	40 (100)
	Personal doctor	-	-	-
	Self	-	-	-
	Others	-	-	-
4.	Take the treatment for			
	Headache	16 (40)	18 (45)	34 (85)
	Body ache	20 (50)	20 (50)	40 (100)
	Irritation on eyes	14 (35)	13 (32.5)	27 (67.5)
	Stiffness in hand joints	15 (37.5)	16 (40)	31 (77.5)
	Burning sensation in fingers	18 (45)	17 (42.5)	35 (87.5)
	Pain in palm	15 (37.5)	13 (32.5)	28 (70)
	Forearm pain	14 (35)	12 (30)	26 (65)
	Pain in cuff muscles	15 (37.5)	16 (40)	31 (77.5)
	Numbness in fingers	15 (37.5)	15 (37.5)	30 (75)
	Cut and wounds	20 (50)	20 (50)	40 (100)
	Fractures	-	-	-
	Cough/cold	20 (50)	20 (50)	40 (100)
	Pain in trunk	16 (40)	13 (32.5)	29 (72.5)
	Backache	12 (30)	13 (32.5)	25 (62.5)
	Shoulder pain	16 (40)	11 (27.5)	27 (67.5)
5.	Did the treatment help?	16 (40)	18 (45)	34 (85)

Values in parentheses indicate percentage

Table 3 : Relationship between type of activity and musculoskeletal pain/discomfort (n=40)

Sr. No.	Activities	Chi Square value for relationships
1.	Digging, crushing clay and musculoskeletal pain/ discomfort	14.033*
2.	Wetting clay and musculoskeletal pain/discomfort	0.25 NS
3.	Mixing clay and musculoskeletal pain/discomfort	1.987 NS
4.	Loading and pushing wheelbarrow and musculoskeletal pain/discomfort	7.764*
5.	Shaping bricks and musculoskeletal pain/discomfort	19.089*
6.	Drying bricks and musculoskeletal pain/discomfort	0.446 NS
7.	Loading bricks and musculoskeletal pain/discomfort	19.768*

* Significant at 5 % level of significance at [(c-1) (r-1)] degree of freedom

NS - Non significant

and back problems. Posture and force analysis found poor standing posture and undesirable wrist positions, accompanied by significant force loadings.

A study conducted in the Netherlands of 10,813 employees and used self-reported work-related neck and upper limb symptoms reported that the tailors (47 per cent), building construction workers (43 per cent), loaders/unloaders (42 per cent), secretaries and typist (38 per cent) were some of the occupations with the highest annual prevalence of symptoms. This compared to the lowest prevalence found for commercial occupations (21 per cent), (Blatter *et al.*, 1999).

Conclusion:

Based on the descriptive results, it could be concluded that the brick factory workers performs different activities in different awkward posture for a longer period of time and they suffer from discomfort and pain in different parts of their body, specifically in neck, back, knees, and elbow regions. The feeling is aggravated if those strenuous activities are performed for a prolonged time. Consequently, they are fatigued after such arduous tasks. This not only hampers their education and normal physical activity but it may also result in the development of a serious musculoskeletal disorder in the near future.

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REFERENCES

- Blatter, B.M.**, Bongers, P.M. and de Witte, H. (1999). Work related neck and upper limb symptoms (RSI): high risk occupations and risk factors in the Belgian working population. TNO Arbeid rapport projectnr. 4070117r9900409, Hoofddorp, The Netherlands.
- Faucet, J.**, Garry, M., Nadler, D. and Ettare, D. (2002). A test of two training interventions to prevent work-related musculoskeletal disorders of the upper extremity. *Applied Ergonomics*, **33**: 337-347.
- Hagberg, M.**, Silverstein, B., Wels, R., Smith, M.J., Hendrick, H.W., Carayon, P. and Perusse, M. (1995). *Work – related musculoskeletal disorders: a reference book for prevention*. Taylor and Francis, London.
- Kilbom, A.**, Armstrong, T.J., Buckle, P., Fine, L.J., Hagberg, M., Haring-Sweeney, M., Martin, B., Punnett, L., Silverstein, B., Sjogaard, G., Theorell, T. and Viikari-Juntura, E. (1996). Musculoskeletal disorders: Work-related risk factors and prevention. *Internat. J. Occupational & Environ. Health*, **2**: 239-246.
- Saldana, N.** (1996). Active surveillance of work-related musculoskeletal disorders: an essential component in ergonomic problems. In Bhattacharya, A. and Mc. Glothlin, J. (Eds.), *Occupational ergonomics: Theory and practice*. Marcel Dekker, Inc., New York pp.489-500.
- Trevelyan, F.C.** and Haslam, R.A. (2001). Musculoskeletal disorders in a handmade brick manufacturing plant. *Internat. J. Industrial Ergonomics*, **27**: 43-55.

