

INVOLVEMENT OF RURAL WOMEN IN BRICK MAKING ACTIVITY

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ABSTRACT

A study was undertaken in Balak village of Hisar district of Haryana state to determine the physical cost of work of women engaged in brick making activity. The experiment was carried out on 30 women each falling between the age group of 25-40 years. The results revealed that mean age of the respondents was 32.96 years, mean body height was 153.66 cm and mean weight was 51.7 kg. Average time spent in brick making activity was 6 hours per day and on an average women travelled 2km while doing the activity of loading of bricks. The postural analysis showed the highest angle of curve and deviation for cervical and lumber region. Periodic training programmes should be organized to emphasize on educating workers regarding the recognition of musculo-skeletal disorders, importance of rest pauses and maintaining proper posture during brick making activity.

Key words : Posture, Brick making, Heart rate, Grip strength

the experiment various parameters viz., time and activity profile, physiological and biochemical stress were studied.

The women are the back bone of agricultural workforce and they perform most strenuous and back breaking tasks. The world over rural woman are an integral and vital force in the development processes that are the key to socio-economic progress. Rural women as agricultural labour force across much of the developing world produce 35-45% of gross domestic product and well over 50% of the developing world's food.

Assessment of physiological stress

Heart rate :

Heart rate was recorded using polar Vantage NV Heart rate monitor. In the morning resting heart rate/min of the respondents for 5 min was recorded and after that she started her activity and her working heart rate/min and rating of perceived exertion (RPE) were recorded for 20 min. After that they were asked to take rest and their recovery heart rate/min and RPE were recorded till complete recovery or up to maximum of 10 minutes. At the end of the day the working heart of respondent was recorded for 20 minutes besides RPE after that respondents were on rest and the recovery heart rate/min and RPE was recorded till complete recovery or upto maximum of 10 minutes.

There are so many sources of employment for women. Women are engaged in agriculture in rural sector and in other side women also actively participate as a labourer in brick making, carpet making, weaving, spinning, papad making. Because of low literacy rate, a large section of women are compelled to work at brick kilns. During the activity, they adapt unnatural body posture leading to physiological stress and they face many types of musculo-skeletal problems, ultimately decreasing the efficiency of women. Therefore, considering the critical problem of women at work, an attempt was made to ergonomically study the physiological stress of women working at brick kilns which includes physical fitness, time and activity profile.

Energy expenditure and TCCW :

From the average values of heart rate, energy expenditure, total cardiac cost of work (TCCW) and physiological cost of work for brick making were calculated with the help of formulae given by Varghese *et al.* (1995) as below :

METHODOLOGY

The study was carried out on 30 physically fit women involved in brick making activity, each falling between the age group of 25-40 years. The experiment was conducted in the month of October-November. During

$$\text{Energy expenditure (kJ/min)} = 0.159 \times \text{AHR} - 8.72$$

$$\text{Physiological cost of work} = \text{-----}$$

Total time

TCCW : Cardiac cost of work (CCW) + cardiac cost of recovery (CCW)

CCW : Increase in heart rate (HR)+ duration of activity

AHR : Average working heart rate – Average resting heart rate

CCR : (Average recovery heart rate – Average resting heart rate) x duration of activity

Recording of muscular stress :

Grip fatigue : Strength of grip muscles at rest – strength of grip muscles at work/strength of muscles at rest x 100

Angle of deviation : By subtracting the angle of bend from angle of normal curve of the back.

Musculo-skeletal problem : A human body map was used to identify the incidence of musculo-skeletal problems in different parts of the body. Five point scale ranging from very severe discomfort to very mild discomfort (1) was used to quantify the stress on muscles.

RESULTS AND DISCUSSION

Physical characteristics :

The mean age of the respondents engaged in brick kiln activity was 32.96 years, measuring body height of 153.86 cm and body weight as 51.76 kg. Most of the women (60%) had mesomorph body and followed by ectomorph body, 30 per cent (Table 1).

Time and activity profile :

On an average women spent 4 hours in brick making activity per day during which every respondent makes an average of 720 bricks (Table 2). On an average, women travel 2 km while doing the activity of loading of bricks. During which she carried and loaded on an average of 425 bricks per day. Both type of loading included, one for baking at kiln and other for marketing. On an average a woman spend 72 days in brick making and loading activity per year. On the basis of respondents perception, two sub activities i.e carrying load and brick making with the stencil

Table 1: Physical characteristics of selected respondents

Variables	Mean
Age (years)	32.96
Height (cm)	153.86
Weight (kg)	51.76
Body mass index (kg/m ²)	21.82

Table 2: Time and activity profile of selected respondent for brick making and loading activity for one day

S. N.	Activity	Age group ⁷⁹ (25-40 yrs)
A	Digging the soil	Traditional skill
1	Average time spent for digging (hrs)	1
B	Making the dough	Traditional skill
1	Average time spent for dough making (hrs)	1
C	Brick making activity	
1.	Type of implement used for performing the activity	Traditional skill
2.	Average time spent for whole day (hrs)	4
D	Loading activity	
1.	Average distance traveled on whole day (km)	2.0
2.	Average time spent for loading activity/day (hrs)	2.0
3.	Average number of bricks loaded per day	425

was selected for further agronomical analysis

Physiological stress :

Physiological stress of brick makers was determined on the basis of various parameters like average and peak heart rate, energy expenditure, physiological cost of work.

Observations of Table 3 show that slight increase in average and peak heart rates was reported during evening. The average and peak heart rate were 110.8 and 128 beats per minute in the morning whereas 122.2 and 140 beats per minute in the evening for brick making. The value of peak energy expenditure was comparatively more in the evening (13.54 kJ/minute) it was whereas 11.63 kJ/minute in the morning and the value of average energy expenditure was 16.89 kJ/minute in morning whereas 10.71 kJ/minute in evening. For loading activity, same kind of trends was observed.

It was observed from the results that on the basis of average and peak heart rate, the brick making activity was moderately heavy in the morning and heavy in the evening.

Grip strength :

Grip strength was determined to assess the muscular fatigue before and after the activity.

Percentage change in the grip strength of the subject before, during and after activity for left and right hand

Table 3: Classification of work load based on average and peak heart rate N=30

S.N. Parameters	Morning	Evening
Brick making activity		
1. Average working heart rate (beat/min)	110.8	122.2
2. Peak working heart rate (beat/min)	128	140
3. Average energy expenditure (KJ/min)	16.89	10.71
4. Peak energy expenditure (KJ/min)	11.63	13.54
5. Average work load	M. Heavy	Heavy
6. Peak work load	Heavy	Heavy
Loading activity		
1. Average working heart rate (beat/min)	-	135
2. Peak working heart rate (beat/min)	-	148.6
3. Average energy expenditure (KJ/min)	-	12.75
4. Peak energy expenditure (KJ/min)	-	14.91

separately have been given in Table 4.

Table 4 clearly indicates average muscular grip strength in both cases before, and after the activity for both right and left hands. Grip strength for right and left hands before and after the activity were 26.5,22.0 and 23.4, 22.4kg, respectively in the morning. Corresponding figures in evening were 25.0, 21.9 and 22.3, 20.1kg, respectively. Grip strength was more in morning as compared to evening. The reason could be that as the day progresses the woman gets tired of doing work and this affects her capability to do work due to which her grip strength also decreases.

Postural analysis :

To analyze the effect of posture adopted spinal angles at cervical and lumbar region in both positions i.e. normal and working postures were measured.

Table 4: Percentage change in grip strength (kg) of respondents in existing condition : n=30

S.N.	Grip strength (kgs)	Right		Left	
		Morning	Evening	Morning	Evening
1	Before work	26.5	25.0	22.0	21.9
2	After work	23.4	22.3	22.4	20.1
3	Percentage change in grip strength	11.7	10.8	10.9	8.2

Result of Table 5 indicate that for lumber region the angle of deviation was higher than the angle of deviation for cervical region. It was 6.3° for cervical and 9.9° for lumbar region. This deviation is because women bent forward for digging the soil.

Table 5 : Average spinal angles at cervical and lumbar region of women N=30

	Normal	Bending	Deviation
Cervical	200.4	194.1	6.3°
Lumbar	201.9	192.0	9.9°

Musculo-skeletal discomfort :

To study the musculo-skeletal discomfort, body map was used to analyze the magnitude of body pain of women while brick making. It can be seen from the data Table 6 that magnitude of discomfort was greater in head, neck, shoulder joint/upper back, wrist low back, mid back, and upper leg. The possib reason for discomfort may be because they carry heavy load on their head instead of using some load bearing equipment and adoption of incorrect posture for long period of time without any frequent change in posture.

Table 6 : Musculo-skeletal discomfort faced by the respondents N=30

Body parts	Mean scores
Head	4.6
Neck	4.0
Shoulder joint	5.0
Upper arm	2.2
Elbow	0.1
Lower arm	3.2
Low back	4.6
Wrist	2.0
Buttock	3.8
Upper leg	3.4
Knees	3.2
Ankle	1.5
Upper back	4.5
Mid back	4.1
Fingers	1.5
Feet	2.

CONCLUSION

Generally women performing brick making activity, they are engaged in construction of the brick during morning hours and loading the bricks during evening hours. All of the respondents used traditional skill for brick making. During brick making activity from morning till evening, respondents usually adapt squatting posture and

they continue to work in this posture for long duration and secondly carrying heavy load on head and they reported severe pain in head, shoulders, lower back and knees. Hence, periodic training programmes should be organized giving emphasis on educating workers regarding recognition of musculo-skeletal disorders and importance of rest pauses and maintaining proper posture while performing brick-making activities.

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