

## **An analysis of physiological problems due to unnatural postures adopted by rice mill workers**

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**ABSTRACT:** The present study encompasses a physiological problem faced by common rice workers. The study is exploratory in nature, and the primary objective is to determine the magnitude of physiological strain of the workers in actual situation of work. Therefore, we can say that this study has undertaken to evaluate the food grain-handling workers with respect to their workload, energy expenditure and musculoskeletal pain discomfort resulting out of work practice. The subjective assessment of respondents showed that mild to moderate pain was experienced by rice-mill workers in upper and lower extremities. The results also revealed that selected respondents adopting standing, forward bending (half bending), complete bending posture and frequency of postural change varied from approx. 2-8 times (standing), 6-12 (forward bending) and 7-11 times (complete bending) for almost all activities performed by workers in rice mill.

**Key words:** Musculo-skeletal pain, posture and frequency of postural change, postural deformity, energy expenditure, work load.

Paddy is the one of main crop in India and it has processed in rice mills and stored in several organizations such as the Food Corporation of India (FCI), Central Warehouse Corporation (CWC), State Warehouse Corporation (SWC) etc. It has been reported earlier that the workers exposed to grain dust in storage air suffers from respiratory, allergic, patho-physiological disorder and other occupational health hazards (Braton, 1992) and it was also observed that when it goes for processing the rice mill workers have to adopt frequently so many body postures according to the requirement of the processing work which leads to physiological strain and musculoskeletal problem. Load handling i.e., lifting and carrying heavy load of grain filled sacs is the major job component in these organizations. Ergonomics is the study of men, machine and environment which is directly related to equipment, adjusting workstations, job rotation or shifting, and other changes in the way work is performed. Application of force required for handling load (lifting, holding, carrying loads, pushing and pulling weights etc). Awkward and unnatural body posture also causes the work to become strenuous and the physiological costs are higher in non-erect postures giving rise to musculoskeletal strains and low back pain (Aaras and Westgaard, 1988). Turning, twisting, bending

and frequently changed postures are very much associated with increased incidence of low back disorder like pain, ache and discomfort due to heavy workload. It was observed during work that the workers had to bent and twist their neck and back for putting the load on the shoulder. Therefore, the present study is carried to access the physiological cost of work during various activities of the rice milling; to examine the effect of unnatural postures while performing task; to recognize the environmental parameters and related health problems; and to envisage the subjective feeling and body pain of the rice mill workers.

### **MATERIALS AND METHODS**

Descriptive research design was chosen to find out existing working conditions, faulty postures and physical discomfort of the workers and experimental research with selected 15 respondents out of 33 sample size was planned to find out Physiological Cost of Work in terms of heart rate, energy expenditure and postural stress while loading the rice bags, related discomfort and health hazards caused. Independent and dependent variables were taken into consideration of the study. The data were collected through a structured interview

schedule and record sheet. Pain experienced by respondents in different body parts were measured with the help of suitable body map and angle of deviation was taken with the help of flexi curve and in order to ascertain the degree of severity of pain, a five point scale was used given by Verghese *et al.* (1996).

Activities taken:

- Loading / unloading of food grain sac on and from vehicles.
- Spreading paddy on the un-shaded floor with a wooden spreader for drying.
- Carrying paddy filled sac, climbing ladder and emptying sac in the processing machine.
- Filling sacs with rice in bending posture. Lifting and keeping the rice filled sacs on and from weighing machine.

## RESULTS AND DISCUSSION

### Assessment of physiological cost of work (Mean $\pm$ SD)

Mean value of average working heart rate and energy expenditure of the subjects carrying out various activities in rice mills have been presented in Table 1. The workload of workers engaged in various types of activities performed by the rice mill workers ranged from “moderate” to “extremely heavy”, depending on the basis of classification. The mean value of average working heart rate varied from  $115.2 \pm 4.38$  (spreading) to  $151.0 \pm 18.58$  beats/min (carrying).

The energy expenditure values for the activities were  $3.76 \pm 0.20$  and  $5.37 \pm 0.84$  kcal/ min for the spreading and carrying/climbing/emptying activities, respectively. When the workload was classified based on the energy expenditure values, the jobs were found to be “moderate” and “heavy”, regardless of the basis of classification.

### Environmental parameters and related problems

Figure 1, indicating the environmental parameters observed during the study shows that most affecting parameters was temperature (63.63%) followed by humidity (51.51%), lighting (36.36%) and noise (15.15%) created by the plant of rice mill. As these parameters were creating the adverse affect on the health of workers as they were suffering from the occupational health hazards like eyes problems, body pain and joint problems etc. These may lead to risk like slip and fall injuries.

### Frequency of postural change of related respondents

The results revealed that selected respondents were adopting standing, forward bending ( half /partial bending ), complete bending posture , and frequency of changing postures varied from approx 2-8 times( standing), 6-12 times(forward bending) and 7-11 times ( complete bending) for almost all selected activities performed by workers in rice mill.

As the frequency of changing posture revealed that the workers were feeling uncomfortable and were bring to fit themselves to the task rather than fitting the task to them which was resulting of increased heart rate and energy expenditure as also reported by Rio, (1998).

### Postural deviation (angle of deviation in lumber region) of selected rice mill workers

It was observed that angle of deviations of selected rice mill workers as compared to the normal curve were 3.62, 5.06 ,4.11, 4.51 and 1.82 degree when forward bending (half bending) posture was adopted for selected activities in rice mill and 10.57 and 14.71 were found when complete bending postures were adopted in activities which are mentioned in Table 3.

The results of subjective assessment of workloads are shown in Table 4 and were assessed on the basis of scale given by Corlett and Bishop (1976). As data depicts that the highest percentage of the workers expressed that workload was moderate and rest of the workers expressed that their work was falling in the category of heavy work (23.10%). It is interesting to note that nobody had expressed his workload as very heavy.

The subjects had multiple responses regarding pain or discomfort in various parts of the body. Results of the assessment of the subjective feeling of body pain or discomfort of the workers are reflected in above table. In rice mill workers reported maximum pain in knee and low back (61.5%) each followed by chest and leg (30.8%) each.

## CONCLUSION

On the basis of the study it was concluded that environmental parameters were creating the adverse affect on the health of the rice-mill workers as they were suffering from the occupational health hazards like slip and fall injuries, eye problems, increased heart rate, body pain and joint problems etc and the angle of spinal curve

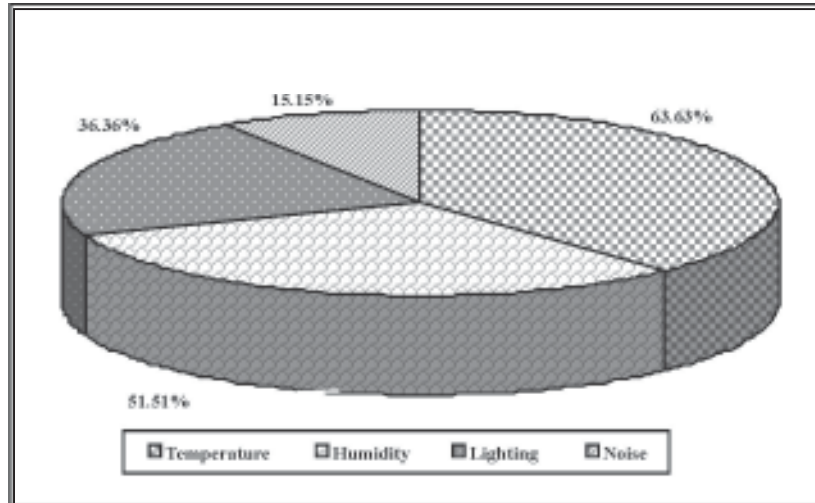


Fig. 1: Environmental Parameters and Related Problems

Table 1: Assessment of physiological cost of work (Mean ±SD)

Activity	Average working heart rate(b/m)	Energy exp(kcal/m)
Loading/uploading	145.1±13.2	5.11±.49
Spreading	115.2±4.4	3.76±0.20
Carrying/climbing/emptying	151.0±18.6	5.37±0.84
Filling	140.7±23.7	4.91±1.07
Lifting and taking off	116.9±11.8	3.84±0.53

Table 2: Frequency of postural change of related respondents

Sl. no.	Activities	Postures	Frequency of change
1.	Loading / uploading of paddy sac	Standing	3-5
		Forward bending(half bending)	6-8
		Complete bending	5-10
2.	Spreading paddy on the floor	Standing	2-8
		Forward bending	6-11
3.	Carrying paddy filled sac	Standing	2-3
		Forward bending	3-5
4.	Climbing ladder	Forward bending	3-8
5.	Emptying sac in the processing machine.	Standing	3-8
		Forward bending	5-8
		Complete bending	7-11

**Table 3: Postural deviation (angle of deviation in lumber region) of selected rice mill workers**

Sl no.	Activities	Variables	Angle of deviation
1.	Loading /uploading	A. Angle of normal curve(standing) B. Angle of forward bending C. Angle of deviation(B-A) D. Angle of complete bending E. Angle of deviation(D-A)	193.81 197.43 3.62 204.38 10.57
2.	Spreading paddy on the unshaded floor	F. Angle of forward bending G. Angle of deviation(F-A)	198.87 5.06
3.	Carrying paddy filled sac	H. Angle of forward bending I. Angle of deviation(H-A)	197.92 4.11
4.	Climbing ladder	J. Angle of forward bending K. Angle of deviation (J-A)	198.32 4.51
5.	Emptying sac	L. Angle of forward bending M. angle of deviation(L-A) N. Angle of complete bending O. Angle of deviation(N-A)	195.63 1.82 208.52 14.71

**Table 4: Subjective assessment of the workload of the worker**

Workload	Percentage (%)
1 Light	-
2 Moderate	76.90
3 Heavy	23.10
4 Very heavy	-
5 Extremely heavy	-

**Table 5: Subjective feeling of pain or discomfort reported by the workers**

Body part	Percentage
Shoulder	15.4
Elbow	-
Chest	30.8
Abdomen	61.5
Low back	61.5
Leg	30.8
Knee	61.5
Ankle	61.5

increased to the maximum in complete bending posture which was the most disturbing and tiring posture for the worker. A highest percentage of the workers expressed that workload was moderate and rest of the workers expressed that their work was in the category of heavy and the maximum pain was felt in knee and low back. The rate of occupational health hazards was more in the workers who were engaged in the same job from a longer period of time or having more experience

#### REFERENCES

- Aaras A. and Westgaard R.H.** (1988). The effect of improved workplace design on the environment of work-related musculo-skeletal. *Applied Ergonomics*, **16**: 91-97.
- Braton N. J.** (1992). Occupational causes of disorder in the upper limb. *British Med .*, **34**:309-11
- Corlett E.N. and Bishop R.P.** (1976). A technique for assessing postural discomfort. *Ergonomics*, **19**:175-82.
- Rio R. P.**(1998) Musculoskeletal stress and health. [www.ergo.huma.cornell.edu/guide-net.html](http://www.ergo.huma.cornell.edu/guide-net.html)
- Verghese M.A., Atreya N. and Bhatnagar A.** (1996). Ergonomic studies in India. Tech Bull PG Department of Family Resource Management, SNDT Women's University, Mumbai, Pp 26-44.