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Occupational Stress Perceived By Hill Farmwomen of Jaunsar in Manual Chaff Cutting

Kushagra Joshi • B M Pandey • R K Khulbe • Arunava Pattanayak*

ICAR Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora

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ABSTRACT

Manual chaff cutting is an activity which is carried out mainly by women. It is a tedious and time consuming activity. The force exerted while cutting the chaff with a sharp tool without any safety measure and the static position adopted may pose work related musculoskeletal disorders among farmwomen performing the activity. The present study was intended to evaluate the occupational stress posed by chaff cutting activity to farmwomen in terms of postural risk factors involved. Subjects were observed in their normal work conditions. Their postures, number of repetitive movements of the dominant hand were observed and recorded. Rapid upper lumbar analysis technique was used to analyse postural stress. Subjective responses on exertion were also recorded. This study found that there are ergonomic risk factors in manual chaff cutting, which may lead to the development of work related musculoskeletal disorders and in turn may affect productivity and quality of work. Women most often maintain static positions for certain limbs or are involved in repetitive activities while performing the activity. Need for technological and ergonomic interventions are emphasized.

1. Introduction

Occupational stress contributes not only to life stresses, but has an impact on health and, thus, on the quality of life of worker. Many hazards in the environment may pose stress to the worker. When we refer to hazards in relation to occupational safety and health, the most commonly used definition is 'any potential source of harm or adverse health effect on a person or persons' (Breeding 2011). Most of the industries pose hazards to the workers. Agriculture is one of the most hazardous sectors in both the developing and industrialized countries It is ranked as one of the three most hazardous industries together with mining and construction. Women's involvement in various typical farm operations like transplanting, weeding, harvesting, threshing, transporting inputs and produce and the use of age old tools and manual and inefficient post-harvest operations pose a potential threat to occupational health of farmwomen which is also termed as occupational stress.

It is ranked as one of the three most hazardous industries together with mining and construction. Most of the time, the cause remains the carelessness on the part of the worker and unawareness about the work simplification techniques. Women adopt awkward unnatural postures while carrying out an activity. Musculoskeletal disorders are the leading factor for the occupational ill health. An awkward and static posture has been recognized as a risk factor for work related musculoskeletal problems and from an occupational point of view, the cervical spine, head, shoulder, low back, elbows and wrist joint can be considered as risk factor. This risk increases with lack of mechanization. Even today, Indian agriculture depends to a very large extent on manual labour in some parts of the country. Although modernization has reached, it is not much evident in tribal and hilly regions. Though the agricultural work-force is by far the major work forcing the third world countries, its work organization has not received much attention.

*Corresponding author: apatttanayak@gmail.com

Dependence on manual labour is a major cause of occupational stress and hazards in agriculture. Apart from cereal production (rice, wheat, *etc.*) farmwomen in hills are engaged in travelling long distances for fodder collection and thereafter chaff cutting to feed the livestock. In Jaunsar region of Uttarakhand, every household practices crop cultivation along with livestock rearing. Every household on an average tends two buffalos, one cow and two goats. The demand for fodder is higher and for that women travel long distances to fetch fodder. In winters, fodder for rainy season is stored and after cutting, chaff is fed to the livestock. Being women dominant, the chaff cutting is a tedious and time consuming activity. The force exerted while cutting the chaff with a sharp tool without any safety mechanism and the static position may pose work related musculoskeletal disorders in farmwomen performing the activity. Against this backdrop, a study on occupational stress involved in chaff cutting was carried out among tribal farmwomen of Jaunsar region and the potential risk involve in the activity was examined.

2. Materials and Methods

2.1 Locale of study

The Jaunsar tribal region in Uttarakhand, comprising of Kalsi and Chakrata blocks in Dehradun district was selected purposively In this region, adopted villages of ICAR VPKAS, Almora in Juansar region under TSP scheme were selected and further thirty five women were selected for survey purpose. To assess the postural risk involved in manual chaff cutting activity, ten healthy and physically fit women of 21-45 years age were selected.

2.2 Tools used

Direct observation, activity analysis, interviews, photography and video were used to measure the quantitative ergonomic risk factors.

Measurement of psychophysical parameters

For assessment of psychophysical parameters, Body Part Discomfort Score (BPDS) and rated perceived exertion (RPE) were used. A Borg's scale for rated perceived exertion (RPE) was used to measure the effort involved in a particular task and was also administered at the end of 30 minutes of work. The RPE scale includes verbal anchors and an accompanying scale ranging from 0 to 10. Subjects were asked to identify the number and description that best represented their level of exertion. To measure localized discomfort, Corlett and Bishop (1976) technique was used by dividing the subject's body into 13 regions and the subject was asked to indicate the regions which were intolerable pain/discomfort, moderate pain/discomfort and just noticeable pain/discomfort. Similar methodology has been used in past studies (Mukhopadhyay *et al.,* 2007, Varghese, 1994) for identification of ergonomic risks in an activity.

Postural analysis for musculoskeletal risk factors

For examining the biomechanical stress involved in manual chaff cutting activity, the rapid upper limb assessment method (RULA) was used (McAtamney and Corlett 1993). RULA (rapid upper limb assessment) is a survey method developed for use in ergonomics investigations of workplaces where work-related upper limb disorders are reported, providing a quick assessment of the postures of the neck, trunk and upper limbs along with muscle function and the external loads experienced by the body. A coding system is used to generate an action list which indicates the level of intervention required to reduce the risks of injury due to physical loading on the operator.

Placement of Figure 1

3. Results and Discussion

Activity analysis

It is a very dynamic activity involving frequent movements of hands. It always carries a risk for amputation of fingers/ lacerations while cutting with sharp tool. While cutting chaff manually with the tool, the repetitive movement of the dominant hand of farm women was found to be 48.9

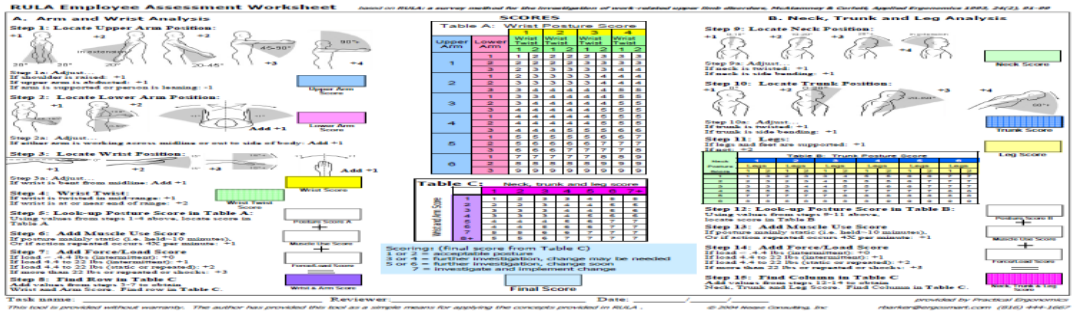


Figure 1. RULA score sheet

movements/minute which is much higher. Repetitive activities do not give the body parts enough time to recover. This results in a build up of micro traumas in the soft tissues of the body and sets the stage for many major disorders or injuries in the future (Kumar 2001, Kilbom 1994).

Discomfort / Pain experienced by farmwomen

A sample of 30 farmwomen involved in chaff cutting activity in Jaunsar region were asked to rate their perceptions of exertion and the body parts where maximum discomfort is perceived while carrying put the activity on daily basis. The rated perceived exertion by farmwomen in carrying out the activity was assessed through Borg scale. It was found that the respondents rated the activity with a score of 7.5 which indicates that very strong exertion is experienced in the activity. As indicated by Figure 2, most of the women reported pain/discomfort in upper back (30%) followed by pain in lower back (25%), lower arm (and upper arm (15 % each), with a few reporting for discomfort in shoulder (10%) and neck (5%).

Placement of Figure 2

Postural analysis by RULA

For analysing the posture adopted by farm women while carrying out the manual chaff cutting activity, Rapid Upper Limb Assessment (RULA) (McAtamney and Corlett 1993) working posture analysis was used to analyse the postures and the associated risks. The movements of women carrying out the activity were recorded and later on analysed. The graph below (Figure 3) shows the RULA scores for selected farmwomen. It indicates that posture scores of most workers are well above the assumed safe scores hence immediate change or ergonomic intervention is needed in the current workplace.

Placement of Figure 3

Most (60%) farmwomen fell into the category of having very high risk and needs change immediately followed by respondents (30%) having high risk and need necessary action.

Postural risk factors

The RULA score of 7 for the chaff cutting activity suggests changes are immediately required to modify the activity. The activity, if carried out for a longer duration, may pose work related musculoskeletal disorders (WMSDs) to the farmwomen. Postural analyses found that many of the postures associated with chaff cutting task were of high risk and require immediate intervention to prevent and treat WMSDs.

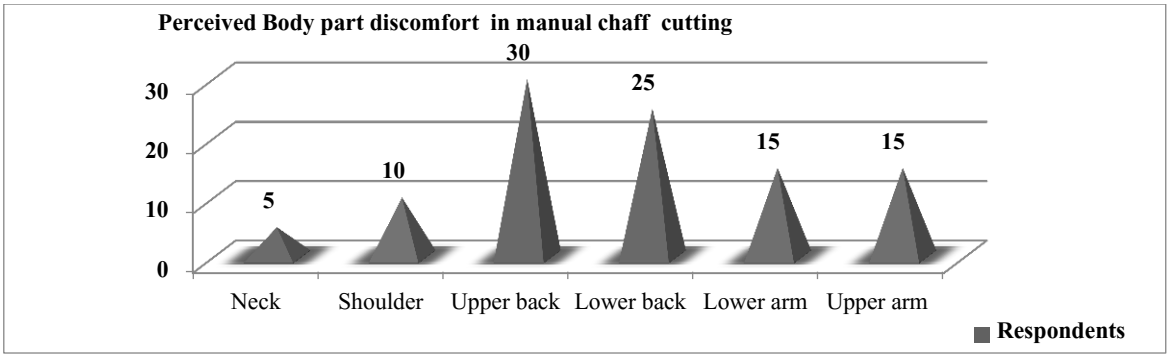
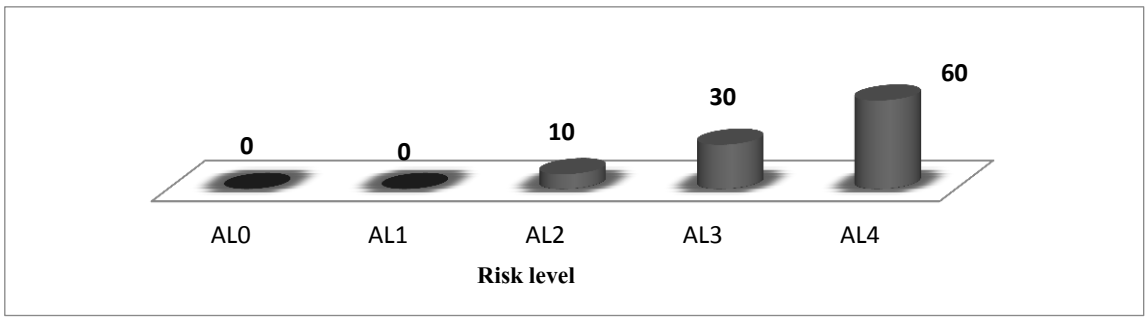


Figure 2. Discomfort experienced in manual chaff cutting activity



*AL_0 indicating 'negligible' risk level, AL_1 = low risk, AL_2 = medium risk level , AL_3 =high risk & action necessary now, AL_4 = Very high risk & implement change

Figure 3. Postural risk involved in manual chaff cutting activity

Particularly vulnerable postures such as forward flexion and upper arm abduction adopted while performing the activity can increase the chances of WMSDs. Forward flexion and abduction of the upper arm stresses the glenohumeral capsule and renders it vulnerable to injury (Mukhopadhyay *et al.,* 2007). This is mainly due to static muscular load and postures deviating from the neutral position for long durations. Such findings have been reported in similar field studies on manual brick workers and also in a controlled environment (Sen and Chakraborty 1984). Previous studies have found that these work conditions impact the quality of work, productivity, and occupational health and safety of the workers, increasing their risk of developing WMSDs. The results are supported by Zakiuddin and Modak (2011) who conducted a study on Kadwa cutter. Traditionally for the operator it is done manually which is physically demanding through its energy and postural requirements and is commonly regarded as source of drudgery. Many farmers associated with this task reported back, shoulder and wrist discomfort. These work conditions impact the quality of work, productivity, and occupational health and safety of the workers, increasing their risk of developing WMSDs.

Conclusion

This study found that there are ergonomic risk factors in manual chaff cutting, which may lead to the development of WMSDs and in turn may affect productivity and quality of work. The risk factors are predominantly related to awkward postures and repetitive movement of the limbs. Interventions for reducing the occupational stress involved in chaff cutting will be most successful if they combine both design intervention (including changes in tool and workstation design) and changes in non-design issues (including the work/rest cycle, rest pauses, correct postures, exercises, and proper training). Safety is also a major aspect in this activity as the sharp tool usage and the repetitive movement of hand poses threat as injury to the fingers. The activity can be replaced with chaff cutter with safety attachments or the cutting tool can be used along with safety mechanism like protection gear for the fingers and arm.

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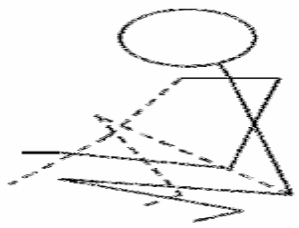
Table 1. RULA score for manual chaff cutting

Posture	Women cutting chaff	RULA Score	Risk level
		7	Very High Risk and Immediate change required.