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## Ergonomic evaluation of “paddy grain picker” used for uploading of paddy grains: A post harvest activity

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### Abstract

In rice cultivation, post-harvest activities are essential for the preparation of rice. Mainly females are engaged in post harvesting tasks and they perform a sequential work through manual efforts. The present study was aimed to evaluate occupational health hazards, musculoskeletal disorder (MSD) and Body parts discomfort (BPD) of farm women during performing the post-harvest activity i.e uploading of paddy grains for storage. A study on ergonomic evaluation of uploading of paddy grain activity by farm women using conventional and improved method was conducted in Jorhat district of Assam. Thirty women workers were made to perform uploading of paddy grain activity by conventional and improved method. The results revealed that the use of improved technology i.e paddy grain picker reduces health hazards of farm women i.e. cuts and wounds, reduces Body parts discomfort (BPD) and increases the comfort and work efficiency of the farm women when compared with conventional method of uploading of paddy grains.

**Keywords:** Post harvest activity, occupational health hazards, MSD, body parts discomfort and paddy grain picker

### Introduction

In India, women constitute about 45 per cent agriculture work force. In addition to their daily household activities, they contribute 50–75 per cent of the total labor required for various production and post-production agricultural operations in the developing countries. The daily work schedule of rural women is very demanding and arduous. It is estimated that during peak period women work every day for about 8-9 hours in agriculture and 4 hours in household activities and there are certain agricultural operations in which female agricultural workers are considered better than male workers (Bhople and Pattai, 1998) [1]. She does the most tedious and back-breaking tasks in agriculture, animal husbandry and homes. The nature and extent of women's involvement in agriculture varies greatly from region to region, even within the region. Also their involvement varies widely among different ecological subzones, farming system, castes, classes etc. but regardless of these variations, there is hardly any activity in agricultural production in which women are not actively involved. It causes lot of drudgery to them and thus low-productivity. But the agricultural roles and needs of women are rarely captured in official reports. The farm women are employed in the operations which are either not mechanized or least mechanized and involve a lot of drudgery (Singh *et al.* 2001) [2]. Women play a significant and crucial role in agricultural development and allied fields. It is most unfortunate that the role of women in agriculture has not yet been highlighted in India. They still remain as invisible workers. There are certain unit operations in production agriculture in which women dominate in production agriculture, post harvest management and agro processing (Aggarwal *et al.*, 2013) [5].

It has been observed that more than 75 per cent women are involved in many post harvest activities like winnowing, grading, threshing, cleaning and uploading of paddy grains. The physical strain of female farmers seems to be too high because of heavy work tasks of various activities done by them in agriculture and allied field (Singh and Vinay, 2013) [4].

force consists of women. But a large number of women have remained as "invisible workers" Loading of paddy grains for storage is one of the most drudgery prone post harvest activity of Assam, which is predominantly performed by farm women. Loading of paddy grains is performed by more than 70 per cent of the rural Assamese women. After proper sun drying, the grains is stored in storage structures such as *bhoral*, *mer*, *duly*, gunny bags etc for consumption or for commercial purposes. Loading of paddy grains is a woman exclusive post harvest activity which is performed manually.

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On an average they spent two to three hours in a day just after harvesting and sun drying of paddy grains. In Loading of paddy grains activity farm women spent ten to fifteen days in a year during the month of December and January. Both left and right hands are used for performing the activity. Work related musculoskeletal disorders (WMSDs) are common health problems among the farm women and related to working without any tool and technology in bad working posture.

### Material and Methods

This descriptive-analytical study was achieved on 30 farm woman who are engaged in post-harvest agricultural activity. Nordic Musculoskeletal Questionnaire (NMQ) was used to study the prevalence of MSDs.

The scale developed by Corlett and Bishop (1976) was used

in identifying the zones of discomfort in different body parts during loading of paddy grain activity.

### Results

#### Ergonomic intervention

Cuts and wounds are the major occupational health hazards of the farm women in loading of paddy grains for storage activity. The use of personal protective equipments (PPE) is not common among the farm women for reduction of occupational health hazards. Work related musculoskeletal disorders (WMSDs) are common health problems among the farm women. For reducing drudgery and enhance comfort and efficiency of farm women in loading of paddy grains for storage, a “paddy picker” was developed. Proper grip was provided in the paddy picker so that the farm women easily grasp the tool for loading the paddy grains.



**Plate 1:** Loading of paddy grains for storage by using conventional method



“Paddy Picker” - for Paddy Grain Storage

**Plate 2:** Design ideation of loading of grains to the carrying basket for storage



**Plate 3:** Loading of paddy grains for storage by using “Paddy Picker”

**Prevalence of work related musculoskeletal disorders (WMSDs) of the farm women**

Prevalence of work related musculoskeletal disorders (WMSDs) of the respondents was assessed by using NMQ method. The highest prevalence of WMSDs symptoms among the farm women were related to body regions such as, neck, shoulders, low back, upper arm, lower arm, hand and wrist. The incidences of work related musculoskeletal problems were observed to be ‘severe’ to ‘moderate’ in loading of paddy grain activity. Data on incidence of musculoskeletal problems reveals that the intensity of pain was ‘severe’ in different body parts in conventional method. The farm women experienced ‘severe’ pain in shoulder joint, lower arm, upper arm, wrist and low back.

Pain was found to be reduced by using the paddy picker while performing the loading of paddy grain activity. It was encouraging to note that the intensity of pain and cuts and

wounds in fingers was totally NIL while using paddy picker.

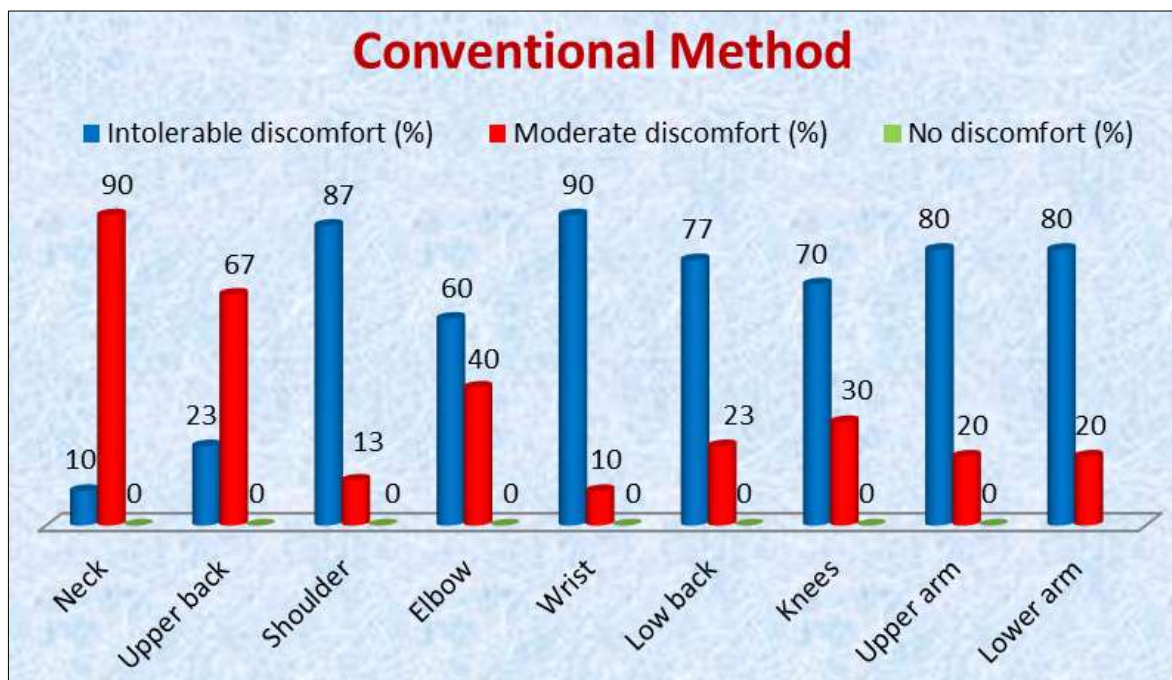
**Body parts discomfort (BPD) of farm women**

The scale developed by Corlett and Bishop (1976) was used in identifying the zones of discomfort in different body parts during loading of paddy grain activity. Most tedious and back breaking farming, livestock and post harvest tasks are performed by farm women. Many of these operations are traditionally done sitting long hours in varying body posture which cause inconvenience and body pain and become source of drudgery for farm women. However, the drudgery of farm women is not yet precisely been identified and quantified (Poonam *et al.* 2019) [6].

In conventional method of loading of paddy grain activity, highest discomfort zones was found to be in wrist (90%), shoulder (87%) and elbow (60%). By more than 60% followed “Moderate discomfort” in neck and upper back as reported by the farm women (Table 1).

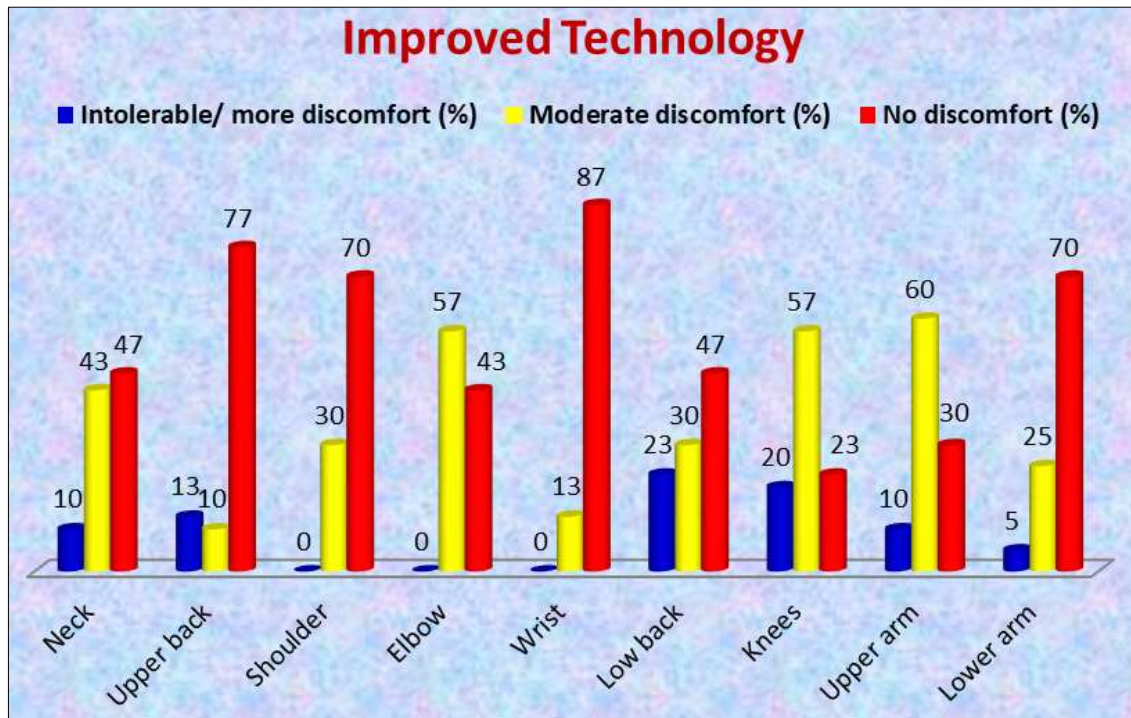
**Table 1:** Body Parts discomfort of farm women the use of “paddy picker” in loading of paddy grains for storage. N=30

Discomfort zone	Conventional Method			Improved Technology		
	Intolerable discomfort (%)	Moderate discomfort (%)	No discomfort (%)	Intolerable/ more discomfort (%)	Moderate discomfort (%)	No discomfort (%)
Neck	10	90	-	10	43	47
Upper back	23	67	-	13	10	77
Shoulder	87	13	-	-	30	70
Elbow	60	40	-	-	57	43
Wrist	90	10	-	-	13	87
Low back	77	23	-	23	30	47
Knees	70	30	-	20	57	23
Upper arm	80	20	-	10	60	30
Lower arm	80	20	-	5	25	70



**Fig 1:** Body Parts discomfort of farm women while using conventional method in loading of paddy grains for storage





**Fig 2:** Body Parts discomfort of farm women while using improved technology- “paddy picker” in loading of paddy grains for storage

On the other hand, highest percentage (87 percent) of farm women experienced “no discomfort” in wrist, followed by more than 70 percent respondents who reported “no discomfort” in upper back and shoulder in use of improved technology i.e. paddy picker. 60 percent of the respondents found moderate discomfort in upper arm and 57 percent in elbow respectively (Table 1). On the whole, use of paddy picker has reduced discomfort of the farm women in loading of paddy grains for storage activity.

### Conclusion

From the findings of the study it can be concluded that the farm women feel highly stressed during working season. Majority of the workers felt pain in neck, shoulder, upper arms and lower arms pain as they were exposed to high level of repetitive post-harvest activity. All these situation ultimately lead to musculoskeletal pain/discomfort in different body parts. It was concluded that majority of the farm women reported high incidence of hazards. Farm women lead a highly stressful life as they are involved in multiple roles- to make their life more comfortable and happier, health hazards by them may be reduced through proper training programmes, well designed hand tools and government intervention.

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