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## Occupational health risk among the females working in wheat crop fields

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### Abstract

Agriculture is a labour intensive sector in which maximum percentage of women from rural areas rely for their livelihood. They are involved in multiple field activities starting from sowing till harvesting. During these activities, due to awkward work posture there is a high performing repetitive activity for long duration which can lead to musculo-skeletal problems. Because of troublesome work positions and repeating of these task there is a high chance of musculoskeletal discomforts like cumulative trauma disorder, repeated motions injury, repeated strain injury and occupational discomfort. The present study was therefore undertaken to find out the participation of wheat cultivation activities, to do the postural analysis of the most frequently performed activity and to identify the work-related musculoskeletal problems of these women. This study was conducted near the area of research in P.A.U on randomly selected of 10 women workers in the age group of 25-45years. One biggest problem is that during harvesting, the stalk of cereals crops became completely dry and hard, thus leading to cuts in hand/arm during harvesting. In addition to this wheat grain contain husk, which get accumulated in employee resulted in itching/ irritation in hands and other parts of the body. The results revealed that the women were mostly involved in seed treatment, sowing, harvesting and cleaning activities in wheat production, out of which wheat harvesting was the most drudgery prone. On an average, they spent 8hours on the wheat harvesting among which they worked continuously for 5 hours without any break. Musculoskeletal problems as reported by the respondents were severe pain in the neck and upper back (2.4) followed by shoulders, wrist, palms, finger and low back (2.3) upper arms, legs and feet (2.2) and numbness was felt in fingers (2.3) stiffness in palms (2.4) and fingers (1.9) and tingling sensation in feet.

**Keywords:** Harvesting employee, female employees, occupational health risks, REBA, WMS

### Introduction

Agriculture is a labour intensive activities sector, where maximum percentage of women work force relies for their livelihood. Although most of the agricultural operation are mechanized but some activities are still performed by the human labour, using drudgery prone tools which not only reduce the work efficiency but also cause many health hazards. They perform almost each and every field activity right from sowing of the crop to harvesting. During these activities the risk of developing musculo-skeletal problems is mainly due to the inconvenient work postures (Chauhan and Saha, 1999) [3]. Wheat harvesting is one of the major problems for farmers/farm women. As it require lots of skill. As matured grains easily detach from the ear heads therefore, fast working tools and machinery cannot be used for harvesting. The application of ergonomic principles would help to increase machine performance and productivity, but mostly help human operator to be comfortable and secure (Maldonado-Macias *et al.*, 2009).

During harvesting activity from morning till evening women usually adapts squatting posture and they continue to work in this posture for long duration without adapting any other posture due to which they reported server pain in lower back, knees and cervical region (Jyotsna *et al.* 2005) [11]. As this method is highly labours demanding, it is clear that poor posture and tool design can cause discomfort even for the healthy person. The REBA is a postural analysis tool sensitive to Musculoskeletal risks in a variety of tasks and assessment of working postures found in health care and other service industries (Hignet and Mc Atamney, 2000) [9]. During harvesting, farm women usually adapt squatting posture and they continue work in this posture from morning till evening.

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Due to this, they reported severe pain in lower back, knees and cervical region. In order to ensure the safety of health improvement of work life there is need to design user's friendly working equipment. Physiological workload can be reduced in the field of agriculture and the work efficiency can be increased significantly in agriculture sector. Hence, a study was conducted in Punjab Agricultural University Ludhiana district to reduce the drudgery and increase working efficiency of farm women during wheat harvesting.

**Objectives**

- To analyze the work pattern of females involved in wheat cultivation and identify the most frequently performed activity.
- To analyse the work posture adopted by the women of the most frequent activity performed.

**Research Methods**

Present study was conducted in the Punjab Agricultural University Ludhiana city as per the convenience of the researcher. Ten field workers were selected randomly between the age group 25- 45 years. The study was conducted in two phases as follows:

**Phase I:** Self designed questionnaire was used to assess the health status of the workers and to find out the most frequent performed activity by them.

**Phase II:** The low cost tools like REBA and risk assessment Scale were used to perform the postural analysis of the most frequently performed activity.

**Research Findings and Discussion**

Table 1 depicts that the average age of the women working in the field was 35 years, average age was 52 kg and average height was 153.8 cm. Average time spent was 8 hours on the wheat harvesting out of six activities which they worked continuously for 5 hours without any break. It is recommended that one should work for a maximum of eight

hours a day (ILO, 1930). A slogan of eight hour's labour, eight hour's recreation and eight hour's rest given by Owen, 1817 depicts that one should never work more than 8 hour.

**Table 1:** General profile of the workers (n=10)

	Parameters	Mean + SD
1.	Age	35.2 + 4.2
2.	Weight	52.5 + 6.2
3.	Height	153.8 + 8.5
4.	Total time spent	8 + 1.0

**Table 2:** Details of workload faced by the respondents

by the respondents			
Category	(Number)	Frequency	Percentage
Holidays per Week	1	7	70.0
	2	3	30.0
Busy hours of the day	• Morning	4	40.0
	• Afternoon	2	20.0
	• Evening	4	40.0
Strategies to manage workload *	Work rotation	10	100.0
	Nothing		

Table 2 displays the workload that they actually faced and the way how they used to handle it. Maximum of them (70%) got only one holiday in a week making a total of 48 working hours per week which is much more than the recommended period of 40 hours per week (ILO, 1962). According to the respondents the busiest hour of the day was morning time. At that time they had to work in a stretch for several hours without taking any rest. To manage their workload, most of them (100%) used the strategy of work rotation by mutual understanding among the co-workers. Given the vast diversity of agricultural activities, this represents a challenge to health care providers. The identification of occupational health hazards and the development of systems to evaluate intervene and decrease the risk factors and resulting disorders can be quite labor intensive and will require extensive occupational health knowledge.

**Table 3:** Types of activities performed by farm workers (n=10)

Activity	No. of female	Percentage (%)
Seed treatment	1	10
Land preparation	-	-
Sowing	1	10
Weeding	-	-
Harvesting	4	40
Cleaning	4	40
Drying	-	-
Storage	-	-

It is observed from Table 3 that, greater percent of female workers engaged in wheat crop performed farm activities like

sowing, cleaning and harvesting (10%, 40% and 40%). Female did not participation in drying, storage and land preparation.

**Table 4:** Physical characteristics of the respondents involved in harvesting work

Grip strength	Right hand	Left hand	Reduction on grip strength	Grip strength	Right hand	Left hand	Reduction on grip strength
Before Activity				After Activity			
(1)	18.5	16.3	+1	(1)	17.5	15.6	+1.3
(2)	15.2	18.4	-.7	(2)	15.9	18.4	
(3)	18	17.2	+9.5	(3)	7.5	18	-.8
(4)	10	19.9	-6.2	(4)	16.2	15.8	+4.1
(5)	18.4	18.5	+2	(5)	18.2	16.3	+2.2
(6)	19.4	18.9	-3.4	(6)	23	21	-2.1
(7)	30.1	24.8	-2.9	(7)	33	30.1	-6.7
(8)	10.8	12.8	+4	(8)	10.4	12	+8

(9)	20.7	15.5	+1.5	(9)	19.2	15	+5
(10)	23.5	21.2	+1.2	(10)	22.3	19.5	+2
Mean	18.46	18.35		Mean	18.32	18.17	
SD	5.8	3.28		SD	7.03	4.8	

It is observed from Table 4 Mean Grip strength of right hand before activity was 18.46 and of left hand was 18.35, means grip strength after activity of right hand was 18.32 and of left hand 18.17.

**Table 5:** REBA analysis of wheat harvesting

Analysis	Score
Posture score A (neck trunk +leg adjust)	4
Load score	0
Score A	4
Posture score B (upper arm+adjust+lower arm + wrist + adjust)	6
Coupling	3
Score B	9
Score C	8
Activity score	1
Final score	9
Action required	High risk, investigate and implement change

Selected for the second phase of the study. Ergonomic evaluation of harvesting activity was performed for the same sample with the help of low cost tool named Rapid Entire Body Assessment (REBA). Table 5 reveals the results of REBA for the harvesting activity. The final REBA score (9) of the threading activity depicted that it involved high risk as a result of which investigation and changes were needed.

**Table 6:** Risk factors leading to MSDs among respondents for wheat harvesting activity (n=10) (Identifying symptoms of Women MSDs)

Body parts	Pain	Numbness	Stiffness	Tingling	Weakness
Neck	2.4	0	0	0	0
Shoulders	2.3	0	0	0	2.2
Upper arms	2.2	0	0	0	2.4
Lower arms	1.4	0	0	0	0
Wrists	2.4	0	0	0	0
Palms	2.4	0	2.4	0	0
Fingers	2.3	2.3	1.9	0	0
Upper back	2.4	0	0	0	0
Mid back	2.1	0	0	0	0
Lower back	2.3	0	0	0	0
Buttocks	2.1	0	0	0	0
Thighs	1.9	0	0	0	0
Legs	2.2	0	0	0	2.2
Ankles	2.0	0	0	0	0
Feet	2.2	0	0	2.1	0

Table 6 indicated the risk factors associated with the harvesting activity that would develop into musculoskeletal disorder if left untreated and unattended. The female were asked about discomforts faced after performing the harvesting activity in their hours. After performing the activity they faced certain pain, numbness, stiffness, tingling sensation or weakness in different body parts. The mean scores of pain felt in neck and upper back was 2.4 followed by shoulders, wrists, palms, fingers and and low back (2.3), upper arms, legs and feet (2.2) mid back (2.1). Numbness was felt in fingers (2.3), stiffness in palms (2.4) and fingers (1.9), tingling sensation in feet (2.1) and weakness in shoulders (2.2), upper arms (2.4) and legs (2.2).



**Plate 1:** Wheat harvesting showed that squatting back pain with increased work force. (Pau Ludhiana)



**Plate 2:** Other agriculture activities threshing



**Plate 3:** Measurement grip dynamometer



**Plate 4:** Cleaning activity

### Conclusion

The female employees involved in wheat harvesting worked for an average 48 hours per week which is much more than the recommended period of 40 hours per week (ILO, 1962). The REBA analysis depicted that the harvesting activity involved high risk, needed investigated and change. Further the risk assessment was done with the help of scale developed on three point continuum which revealed that very high risk was associated with different body parts as pain was felt in the neck and upper back (2.4) followed by shoulders, wrists, palms, fingers and low back (2.3), mid back (2.1) upper arms, legs and feet (2.2) and Numbness was felt in fingers (2.3), stiffness in palms (2.4) and fingers (1.9), tingling sensation in feet (2.1) and weakness in shoulders (2.2), upper arms (2.4) and legs (2.2). Therefore, it can be concluded that wheat harvesting workers are liable to suffer from develop work related musculoskeletal discomforts if left unattended. Work-related musculoskeletal disorders are of serious concern to health care. The purpose of this paper is to the concept of work related musculoskeletal disorders and discusses the basis of their prevention as a primary means of injury and illness.

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