



## Research Article

# DRUDGERY REDUCTION IN FARM WOMEN THROUGH IMPROVED GRAIN CLEANING TOOL IN NIMAR REGIONS OF MADHYA PRADESH

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**Abstract-** The Present study was under taken to find out the different occupational hazards raised by the farm woman during the grain cleaning activity performed with traditional method and to assess the impact of improved tools manufactured by CIAE, Bhopal, on the reduction of physiological and muscular Stresses. During present study, 20 farmwomen were selected having average state of health and result shows that average heart rate and energy expenditure of the woman were reduced significantly while performing the cleaning quality of grain with the use of improved tools manufactured by CIAE, Bhopal. It was recommended that women should be motivated to use the improved tools for grain cleaning to minimize their health hazards.

**Keywords-** Drudgery Reduction, Efficiency, Grain Cleaning Tool

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## Introduction

The role of woman in agriculture is very significant especially the post harvest and agro processing activity like the cleaning, drying, decortications, grinding, cleaning of wheat soybean, gram grains is the most common farm activities performed by the woman is every rural home. Grain and chaff are separated using natural breeze or by creating artificial wind. While doing so the women adopt many unnatural postures like bending, stretching of different body parts which leads to increase in cardio vascular stresses bending, Stretching of different body parts while lead to increase in Cardio vascular stresses. Elisjistone and Nachenson (1970) also found that unnatural postures lead to several muscular skeletal problems, there is a need to develop or improve the existing grain cleaning equipment awarding to the anthropometric needs of the farm woman to reduce their drudgery [1,2]. Keeping in mind these views an improved tool for cleaning of grains i.e., hanging sieve was tested in order to see the impact on the reduction of stresses of farm woman and to measures its impact on the increase of work output. The objectives of the study were to measures the heart rate, energy expenditure, muscular stress and work output of the woman performing the selected activity with traditional and improved tools.

## Material and Methods

Selection of experimental subject: Twenty rural women of Khandwa district in the age group of 25 -45years were selected. They were healthy and had no physical ailment .The grading of health status of woman was done on the bases of BMI. The BMI scores were interpreted as per the classification given by Garrow (1987) [3]. Each respondent was tied the heat rate monitoring machine and was switched on the record the heart rate at every minutes. In order to record the resting heart rate, five minutes rest was given. They were then asked to perform the activity for 30 minutes and heart rate was recorded at an interval of one minute each and than five minutes rest was given. The heart rate during rest and work was recorded while working with traditional as well as improved tools. Based on the

heart rate records the following parameters were calculated-

- Average heart rate during rest and work.
- AHR (beats /min) =Average working heart rate (WHR)-Average heart rate during rest.

For calculation of Energy expenditure rate from heart rate, the Varghese (1995) equation was used which is as follows [4].

- $EER (kj/min) = 0.159X HR (beats/min) - 8.72$
- Output =Kg./hour
- Recording the muscular stresses–muscular stresses during the performance of the activity with traditional and improved tools were also measured with the following methods.

- (a) Grip Strength– Grip strength was measured before and after the completion of activities. It was measured separately both for the right and left hand and the grip strength was determined with the use of following formula.

$$\text{Grip strength is \%} = \frac{Sr - Sw}{Sr} \times 100$$

Where,

Sr = Strength of muscles at rest

Sw=strength of muscles at work

Decreased grip strength with the performance of activity was interpreted as grip fatigue of the muscles.

- (b) Postural analysis – Postural analysis of the lumbosacral region the performance of the activity was done with help of flexi curve. The angle of bend of the back during the performance of the activity was measured and compared with the normal bend of the back and angle of deviation was determined by subtracting the normal angle of bend from the angle of bend

during the bending posture as shown is the figure.

Analysis of data – After collecting data on above parameters Statistical analysis of data was done suitable to each parameter and the inferences were drawn. Average percentages and paired t-test were applied to test the significance of results.

**Results and Discussion**

The results of the present study was that traditional method of grain cleaning heart rate was 108 beats /min and energy expenditure was 9.0 kg/min but with the use of improved tools having sieve (CIAE, Bhopal) heart rate was reduced to 102 beats/min Sandhuet. al. (2001) also proved that by using improved tools/ technology, the physiological workload gat reduced to a great extent [6]. The overall analysis showed that heart rate and energy expenditure were decreased with the use of improved tools hanging sieve.This may be because of the that reason the size of the holes of the hanging sieve of improved tools were smaller which required more energy for sieving the grains as compared to traditional tools and this lead to increase in the heart rate but quality of grains cleaned with improved tools was very good as compared to traditional method.

**Muscular Stresses**

Muscular stresses were measured in forms of frequency of postural change, angle of deviation of backbone and grip fatigue. Data relating to the frequency of postural change is enclosed in [Table -2] and it’s observed that the frequency of postural change was more when grain cleaning activity was done with traditional method and it lead to muscular atigue. The study Conducted by Grandjean (1973) also proved that high frequency of postural change was positively correlated with higher muscular stress [5]. Postural stress while performing the selected activity was measured with the help of flexi curve. Higher angleof bent of the back is the indication of the muscular stress and therefore more severe pain in the back. Angle of deviation was measured both when the women were banding during work. The result given in [Table-3] showed that angle of deviation was more when the women performed the activity with traditional tool *i.e.*, chajj or bamboo winnower which lead to tiredness and drudgery. In improved tools there was no banding of back, therefore complete relief from the muscular pain. These findings are supported by many other studies, which were performed in unnatural postures and approved that more angle of band of the back lead to more muscular stress and therefore more fatigue and drudgery in work.

Results given is [Table-1] shows that with the use of improved tool (hanging sieve) significant reduction was observed in heart rate and energy expenditure but no such result was observed with traditional tool. Results given in the table also showed that there was 88.88% reduction in the standing posture while using improved tool where as 100% reduction in frequency of squatting, bending and sitting posture was observed leading to relief is body pains and muscular tensions. Production per unit was increased to 50% in case of hanging sieve.

**Table-1** Average heart rate Average energy expenditure performing grain cleaning activity

Activity	Average working heart rate (Beats/min)	Average energy Expenditure (kg/min)	Classification of work load
1.Traditional Tools	108	9.0	MH
2.Improved tools (CIAE Bhopal)Hanging sieve	102	6.0	L

**Table-2** Frequency of postural change while performing the sleeted activity

Activity	Frequency of change is postures			
	Standing	Sitting	Barding	Squatting
Traditional tools	8	6	7	5
Hanging sieve	1	-	-	-

**Table-3** Changes is the angle of deviation of the body while performing the grain cleaning activity

Postural analysis	Angle of normal standing	Angle of bending	Angle of squatting
Traditional	188	202	202
Improved tool (CIAE Bhopal)	202	-	-

**Conclusion**

It is concluded that improved tools decreases the health hazards and work load and increases the efficiency of work. The quality of grain was also improved with the use of improved tool.

**Recommendations**

It was observed that the improved tool (hanging sieve) helps in reduction the physiological parameter and also increased the production output to a great extent. It is therefore recommended that woman should be motivated to use improved tool to prevent occupational health hazards and to achieve higher work productivity.

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**Author Contributions:** All author equally contributed

**Abbreviations:**

AHR- Average working heart rate  
WHR- Average heart rate during rest

**Ethical approval:** This article does not contain any studies with human participants or animals performed by any of the authors.

**Conflict of Interest: None declared**

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