



ERGONOMICS PARAMETERS OF FARM WOMEN OF SHAHDOL DISTRICT (M.P.) DURING PADDY HARVESTING

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ABSTRACT :

The study was done in Shahdol (MP) to evaluate the activity profile, ergonomics parameters of farm women during paddy harvesting. The study was carried out on 10 farm women of age group of 25 to 45 years. The mean age of the farm women was 29 years, mean body height was 156.5 cm and mean weight was 47.5Kg. Average working heart rate was 132.4 and 100.7 beats/min for plain and serrated sickles respectively. The output was 160.2 and 150.2 m²/hr for plain and serrated sickle but energy expenditure was found to be 12.33 and 7.29 kj/ min for plain and serrated sickles respectively.

KEYWORDS: Ergonomics, Paddy Harvesting, Heart Rate, Output, Energy Expenditure

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INTRODUCTION:

In India about 60 to 70 percent of the workforce is supported by Agriculture in India. The statistical data reveals that 75 percent of all female workers are in Agriculture while 85 percent of all rural female workers are in Agriculture (Jain, 2007). Women's are the majority of the workers in many critical steps in Agriculture. Farm women are over-burdened due to their multiple –occupations at farm and home, roles and responsibilities. Farm women experience higher drudgery, spend more time and energy, perform back breaking, repetitive and monotonous work e.g. transplanting, weeding, thinning, bundling, gap filling, harvesting, protection of crops ,winnowing etc (Das, 2007). All these operations are done manually and cause considerable physical, mental fatigue and health problems. Farm women face



rigidity in terms of working hours, nature, place and duration of work. The tasks performed by farmers are mechanized whereas the tasks allotted to women continue to be manual and drudgery prone (Das, 2007). A Himalayan study has documented that a farm women works equal to the work undertaken by the bullock and the farmer (Aggrawal, 2003). The study also emphasized to improve the existing skills to improve the production efficiency and reducing the drudgery in day to day work.

Farm women are over-burdened due to their multiple – occupations at ranch and home, places and liabilities. Das (2007) reported that farm women spend more time and energy, perform back breaking, repetitious and monotonous work e.g. broadcasting, weeding, lacing, speeding , gap stuffing, harvesting, protection of crops, winnowing etc. All these operations are done manually and beget considerable physical, internal fatigue and health problems. Farm women face severity in terms of working hours, nature, place and duration of work. The tasks performed by growers are mechanized whereas the tasks distributed to women continue to be homemade and donkey work prone(Das, 2007). A Himalayan study has proved that a ranch women works equal to the work accepted by the bullock and the planter(Agrawal, 2003). The study also emphasized to improve the production effectiveness and reducing the drudgery thereby.

Shahdol cropping system is predominantly paddy- wheat. The farm women play a major role in farm operations such as sowing, weeding, harvesting and post harvest operations. There is a need to inculcate women friendly equipments for various operations depending on location. Thus a study has been made to know the physiological stress and ergonomics of Farm women involved in paddy harvesting.

MATERIALS AND METHODS:

The study was carried out on 10 farm women of the age group of 25-45 years which are involved in paddy harvesting activity. The trial was conducted in the month of Nov-Dec. During the experiment various parameters viz., time and mechanical stress were studied as follows:

Time and Activity profile:

Stopwatch was used to measure the time required and a meter tape was used to measure the area covered.

Assessment of Physiological Stress :

1.Heart Rate :

Heart rate was recorded using a Digital Heart Rate Monitor. In the morning resting heart rate (RHR) of the respondent was recorded and after completion of the activity working heart rate (WHR) was recorded.



2. Energy Expenditure Rate and Cardiac Cost :

From the average values of heart rate and energy expenditure was calculated with the help of formulae given by Varghese et al.(1994) which is as follows

$$\text{EER (kj/min)} = 0.159 \times \text{HR (beats/min)} - 8.72$$

Where,

EER = Energy Expenditure Rate (kj/min)

HR = Heart rate (beats/min)

From the values of change in heart rate (beats/min) and output (m^2/hr) the cardiac cost is calculated.

RESULT AND DISCUSSION:

Physical Characteristics

Mean age of the respondents engaged in wheat harvesting was 29 years, body height 156.5 cm and body weight as 47.5 kg.

Table 1. Heart rate response and output of Farm Women with Plain (local sickle) and Serrated sickle

Farm Women	Heart rate (beats/min)		Output (m^2/hr)	
	Plain Sickle WHR (RHR)	Serrated Sickle WHR (RHR)	Plain Sickle	Serrated Sickle
S1	133(90)	94(78)	162	150
S2	135(82)	101 (77)	159	151
S3	134(86)	103(81)	158	151
S4	136(88)	104(82)	161	152
S5	133(87)	105(87)	158	150
S6	132(85)	96(76)	160	148
S7	129(81)	101(89)	162	149
S8	122(76)	101(78)	161	148
S9	135(82)	102(88)	160	152
S10	135(89)	100(79)	161	151
Mean Values	132.4 (84.6)	100.7 (81.5)	160.2	150.2

The Table 1.shows Heart Rate (HR) of the FW during harvesting of paddy ranged between 122 to 136 beats/min for plain sickle and 94 to 105 for serrated sickle. The mean of HR during work with plain

sickle and serrated sickle was 132.4 and 100.7 respectively. The mean values of area covered by plain sickle and serrated sickle was 160.2 and 150.2 m²/hr respectively.

Table 2. Energy Expenditure Rate of FW with Plain (local sickle) and serrated sickle:

Farm Women	Energy Expenditure Rate (kj/min)	
	Local sickle	Serrated sickle
S1	12.43	6.23
S2	12.75	7.34
S3	12.59	7.67
S4	12.9	7.82
S5	12.43	7.98
S6	12.27	6.54
S7	11.79	7.34
S8	10.68	7.34
S9	12.75	7.5
S10	12.75	7.18
Mean Values	12.33	7.29

The Table 2.shows values of the Energy Expenditure Rate was 12.33 and 7.29 kj/min respectively for plain and serrated sickle. However as the output is more in local sickle ,the heart rate data indicates high cardiac cost per unit area harvested by local sickle 49.6 beats/m² as compare to 40.2 beats/m² serrated sickle. Similar results were also observed during wheat cleaning by HTGC(Sharma et.al.2019).

Table 3. Classification of Work load based on Energy Expenditure rate and Cardiac Cost of area harvested

Activity	Energy Expenditure rate(kj/min)				Cardiac Cost (beats/m ²)			
	Average		Peak		Average		Peak	
	Plain	Serrated	Plain	Serrated	Plain	Serrated	Plain	Serrated
Harvesting of paddy	12.33	7.29	12.75	7.98	49.6	40.2	50.95	41.15

The Table 3.shows Energy Expenditure and Cardiac Cost was more for plain sickle as compare to serrated sickle .



CONCLUSION:

Summarizing farm women performing wheat harvesting activity, give more output with plain sickle as compare to serrated sickle, but the energy expenditure and cardiac cost shows opposite trend. Hence serrated sickle is highly beneficial for farm women of Shahdol for paddy harvesting activity. Also periodic training is required to educate farm women on the cardiac cost involved in each farm activity.

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