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Comparative Evaluation of Exertion Perceived by the Farm Women in Maize Shelling Activity

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ABSTRACT: Agriculture is the main source of employment for women in most of the developing countries. In rural areas about 60-70 percent of agriculture operations is not work efficient and leads to cause drudgery. All the post harvest activities are not only drudgery prone rather time consuming. The study was conducted in Samastipur district in Bihar state to know the musculoskeletal disorders and extent of musculoskeletal problems of farm women in maize shelling activities with the University developed maize sheller over traditional method. The maize sheller design was developed by the Workshop Superintendent under the guidance of the Hon'ble Vice Chancellor, Dr. Rajendra Prasad Central Agricultural University, Pusa. The efficiency of UDMS was ergonomically tested on farm women. The results highlighted that in the traditional method of maize shelling activity, musculoskeletal problems was noted a major problem as cent percent of respondents expressed that they had faced severe pain in their legs, wrist, finger and upper back (100%) each. So far as extent of musculoskeletal problem is concerned, the maximum women expressed severe pain in their wrist (80%), finger(73.3%),shoulder (56.6 %),leg and lower back(56.6%) each, which was followed by a moderate pain in their upper back (53.3%). While in case of newly developed maize sheller machine farm women encountered meager musculoskeletal problem i.e. moderate pain in their lower back and wrist (36.6%) each.

KEYWORD: Ergonomic, Efficiency, Maize shelling, Drudgery, musculoskeletal disorders.

I. INTRODUCTION

India is mainly an agricultural country, having farming as one of the largest occupations. Rural women are the major labour force in agriculture. They perform almost all agricultural activities right from sowing to harvesting and post-harvest activities. Most of the drudgery prone tasks performed by the women in agriculture are cutting, uprooting, transplanting, weeding, sowing along with post-harvest tasks like manual threshing of maize, millet and pulses sieving and cleaning. Traditionally shelling of maize are being done either by threshing cobs or removal of seeds by hand. Studies have revealed that the generally farm activities performed by women are time and labour intensive, monotonous, repetitive and more drudgery prone.

Maize is the third most important cereal crop in India which accounts for 9 per cent of total food grain production in the country. Bihar is one of the largest maize growing state and this crop is grown primarily as a subsistence crop to meet food needs for a long time till recently. Most of the farm women in our state are mainly involved for post harvest activities of the maize viz- sun drying, de~husking, shelling etc. The maize crop is grown in all the seasons, i.e Kharif, Rabi and Summer. Normally cobs are plucked and therefore standing maize stalk is harvested. After plucking the maize cob is de-husked manually and then dried in sunshine to reduce moisture content to 15-21 percent (d.b) for further shelling where as in some part, harvested cob (un-dehusked) is dried in sunshine and then de-husking is done by hand prior to its shelling. Further farmers traditionally taking out maize grain from cob (after de -husking) is either by beating the de-husked cobs with sticks or with finger or sickle etc. These farm activities are not only drudgery prone but it also consumes time. During performing it was observed that usually women perform their activities in unnatural body posture due to which their physical workload increases and they face many types of muscular-skeletal problem as a results the efficiency of women to work decreases to a greater extent. The women farmers are still using traditional methods to remove grains from the maize cobs and particularly in their unnatural body posture which affects the efficiency of farm women. Keeping into

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consideration of these problems of women, a new women friendly maize sheller machine was developed by the workshop superintendent Central workshop, Dr.RPCAU, Pusa under the supervision the Hon'ble Vice Chancellor,Dr Rajendra Prasad Central Agricultural University, Pusa. This machine need to be ergonomically evaluated for its wide popularization in the state.

II. MATERIAL AND METHODS

A study was conducted in Dhobgama and Malinagar village from Pusa and Kalyanpur Blocks respectively in Samastipur district Bihar.From each village 30 respondents was selected. Further, 30 women respondents were taken as controlled group i.e 15 respondents from both the selected village. Survey cum experiment method was conducted on control group respondents (30) in three replications with respect to maize shelling activities. In both methods, 5 kg of maize cobs was given to each respondent as per replication. Time was observed with the stop watch. Incidence of musculoskeletal problems of the respondents were identified by using the body map viz. neck, trunk, legs, upper arm, lower arm, wrist, shoulders, fingers, upper back, lower back. The incidence of symptom frequency score and body tolerance to symptoms were recorded after the completion of the activity. The intensity of pain in the above stated parts of the body was recorded by using a five point scale (Ranjwan 2000).

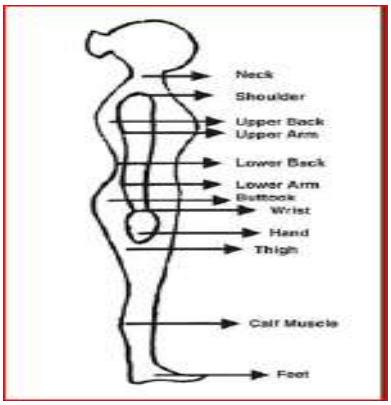

Fig No. 1 Body Map

III. RESULTS AND DISCUSSION

The musculoskeletal problems and symptom frequency score while performing the maize shelling activity in traditional method as well as with the University developed maize sheller.

Table 1. Musculoskeletal Disorders Faced by Farm Women in Maize Shelling

n=30

S. No.	Upper Extremities	Maize Shelling Method			
		Traditional Method		Univ. Developed Maize Sheller	
		Frequency	Percentage	Frequency	Percentage
1.	Neck	25	83.3	3	10.0
2.	Trunk	28	93.3	4	13.3
3.	Legs	30	**100.0**	8	26.7
4.	Upper Arms	27	90.0	9	30.0
5.	Lower Arms	28	93.3	7	23.3
6.	Wrists	30	**100.0**	13	**43.3**
7.	Shoulder	29	96.7	7	23.3
8.	Finger	30	**100.0**	8	26.7
9.	Upper Back	30	**100.0**	12	**40.0**
10.	Lower Back	27	90.0	14	**46.7**

With the help of the body map, musculoskeletal problems experienced by farm women were evaluated while performing the maize shelling activity in the traditional method presented in Table 1 and 2. Table 1 shows that cent-percent respondents (100 %) expressed pain in their leg,

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wrist, finger and upper back followed by pain in their shoulder (96.7 %), trunk (93.3) and lower back 90.0 per cent. While in case of University developed maize sheller farm women felt meagre level of expressed major pain in their lower back (46.7 %), wrists (43.3 %) and upper backs (40.0 %).

Table 2. Extent of Musculoskeletal Problem of Farm Women in Maize Shelling

n=30

Upper Extremities	**Maize Shelling Method**									
	Traditional Method					**Univ. Developed Maize sheller**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Neck	-	11 (36.6)	**12 (40.0)**	2 (6.6)	-	**2 (6.6)**	1 (3.3)	-	-	-
Trunk	-	2 (6.6)	**15 (50.0)**	10 (33.3)	1 (3.3)	-	**3 (10.0)**	1 (3.3)	-	-
Legs	-	-	10 (33.3)	**16 (53.3)**	4 (13.3)	2 (6.6)	**5 (16.6)**	1 (3.3)	-	-
Upper Arms	3 (10.0)	**6 (20.0)**	15 (16.6)	3 (10.0)	-	3 (10.0)	**6 (20.0)**	-	-	-
Lower Arms	2	6 (20.0)	**16 (53.3)**	4 (13.3)	-	2 (6.6)	**5 (16.6)**	-	-	-
Wrists	_	0	2 (6.6)	**24 (80.0)**	4 (13.3)	1 (3.3)	**11 (36.6)**	- (3.3)	-	-
Shoulder	-	5 (16.6)	8 (26.6)	**16 (56.6)**	-	3 (10.0)	**4 (13.3)**	-	-	-
Finger	-	0	8 (26.6)	**22 (73.3)**	-	**7 (23.3)**	1 (3.3)	-	-	-
Upper Back	-	1 (3.3)	10 (33.3)	**16 (53.3)**	3 (10.0)	3 (10.0)	**9 (30.0)**	-	-	-
Lower Back	3 (10.0)	1 (3.3)	**17 (56.6)**	14 (46.6)	5 (16.6)	2 (6.6)	**11 (36.6)**	1 (3.3)	-	-

Intensity of pain

5- Very Severe 4- Severe 3- Moderate 2- Light 1-Very Light

In Table 2 it was observed that in traditional method as reported by majority of selected farm women major musculoskeletal problems in maize shelling activity were severe pain in their wrist (80%), finger (73.3%), shoulder (56.6%), leg (53.3%) and upper back (53.3%). The farm women experienced moderate pain in their lower back (56.6%) followed by upper back (53.3%), trunk (50%) and neck pain (40%). Minimum number of farm women felt light pain in their upper arms. While in case of newly developed maize sheller, it was observed that major musculoskeletal problems in maize shelling activity were moderate pain in lower back (36.6%), wrist (36.6%) and upper back (30 %), upper arm (20%), leg (16.6%) and shoulder (13.3%) in improved method as reported by selected farm women which

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was followed by the farm women (23.3 %) experienced light pain in their finger.

It can therefore be concluded from the above mentioned Table 2 that in the case of traditional method severe pain in their wrist (80%) and finger (73.3%). The major musculoskeletal problems of farm women was while performing maize shelling. Maximum farm women experienced musculoskeletal problems in the neck, trunk, upper arm and lower arms due to unnatural body posture and repetitive hand movements while performing maize shelling activity. In the case of improved method, farm women's faced light pain in their wrist and lower back (36.6 % each), which show that efficiency of newly developed maize sheller as it was quite suitable for women farmers.

IV. ASSESSMENT OF FEELING OF EXHAUSTION AND DIFFICULTY PERCEPTION WHILE PERFORMING THE MAIZE SHELLING

Assessment of feeling of exhaustion and difficulty perception, while performing maize shelling activity by two methods such as traditional method and University developed maize sheller was carried out and data is presented here with under following headings.

Table. 3. Extent of Exhaustion Expressed by Farm Women in Maize Shelling

n=30

Methods of Maize Shelling	Feeling of exhaustion (Mean ± SD)	Reduction/Increase Traditional Vs Univ. Developer Maize sheller	t- values
Traditional Method	4.23 ± 0.76	**2.7 (63.82)**	**15.0****
Univ. Developed Maize Sheller	1.53 ± 0.49		

Note: Figures in Parenthesis indicates percentage, ** Significant at 1% level of significance

Table 3. indicated the farm women's feeling of exhaustion while performing maize shelling activity with the use of traditional and also in an improved methods. The mean score of feeling exhausted by the women in traditional method of maize activity was found higher (4.23) than the mean score of feeling exhausted in improved method (1.53) shows 63.82 per cent of reduction in mean score of feeling of exhaustion was noted in maize shelling activity performed with the University developed maize sheller compared to traditional method. Statistical analysis revealed the highly significant results in case of maize shelling activity performed by the traditional and improved method as t-value came to 15.0** at 1% level of significance. The selected farm women felt significantly less exhaustion when maize shelling was performed by improved method. Hence, it can be concluded that University developed maize sheller is quite suitable to the farm women.

Table.4. Difficulty Perception in Maize Shelling Activity Performed by Farm Women

n=30

Methods of Maize Shelling	Opinion Regarding Difficulty Level (Mean ± SD)	Reduction/Increase Traditional Vs Univ. Developer Maize sheller	t- values
Traditional Method	3.46 ± 0.66	16 (46.24)	**10.0****
Univ. Developed Maize Sheller	1.86 ± 0.49		

Note: Figures in Parenthesis indicates percentage ** Significant at 1 % level

Farm women's perception of difficulties in traditional and improved method while performing maize shelling activity is presented in Table 4 The analysis of results revealed that, in traditional method, the mean score of difficulty perception in maize shelling performed by the respondents was found to (3.46) which was more compared to the mean score of difficulty perception (1.86) in improved method. Further, It was found that the perception of farm women's difficulties reduced by 46.24 per cent in case of University developed maize sheller compared to traditional method. With the application of t-test, the traditional method was compared with the improved method. The t-value came to be 10.0** significant at 1% level of significance. Thus, it can be concluded that farm women's perception of difficulty was less in improved method as compared to traditional method. In traditional method, the level of perception of difficulties was higher because traditional maize shelling activities are not only drudgery prone, but it is also time consuming.

V. CONCLUSIONS:

Manual shelling of maize is a time-consuming and tedious operation. Musculoskeletal problem have become endemic in manual maize shelling. The farm women often make complaint about pain in various parts of the body and the maximum report came to be very severe to severe pain in wrist, ginger and shoulder, while performing maize shelling activities. Though the activity is light, women feel it as a maximum drudgery prone activity because of its monotony in performance, continuous sitting and performing it for a longer period of time. This will lead to perform more work with lesser time and women can become an efficient maize shelling persons, which will make women a self-reliant and self-confident. In nut shell, it can be said that women can earn money with adoption of maize shelling machine.

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