



DRUDGERY REDUCTION OF FARM WOMEN THROUGH IMPROVED TOOLS

SINGH SURABHI¹, AHLAWAT SANTOSH¹, SANWAL SARITA¹, AHLAWAT T.R.² AND GORA ALOK^{3*}

¹ASPEE College of Home Science & Nutrition, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Dantiwada, Banaskantha, Gujarat 385506

²ASPEE College of Horticulture & Forestry, Navsari Agricultural University, Dandi Rd, Navsari, Gujarat 396450

³C.P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Dantiwada, Banaskantha, Gujarat 385506

*Corresponding Author: Email-alok.gora@gmail.com

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Abstract- The present investigation aimed to equip farm women technologically for reducing their drudgery and enhancing their productivity. Three villages were selected purposively from Dantiwada *taluka* near to the university. Total one fifty farm women were selected using simple random sampling technique, fifty from each. The study illustrated that farm women were involved in wide range of agricultural and livestock activities and most of them were perceived as difficult to perform by majority of the farm women. On comparing energy expenditure of farm women during performing agricultural activities in traditional practice and by using drudgery reducing tools, their energy expenditure decreased by using hand ridger (13.381 KJ/min) while it is same by using sickle (10.996 KJ/min) and maize sheller (6.703 KJ/min). Though energy expenditure increased by using groundnut decorticator (9.724 KJ/min), the outcome increased almost ten folds by using each tool.

Keywords- Farm women, Drudgery, Women friendly tools, Energy expenditure, Working heart rate

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Introduction

A huge proportion of rural women involve in agricultural and allied fields like the crop production, irrigation, manuring, post harvest operations, agro/social forestry, livestock activities, fisheries, etc. The extent of women's involvement and type of activities performed by them in agriculture and allied fields varies greatly from state to state even within a state. The farmwomen lead hard lives and perform grueling works in farm and homestead activities. This causes significant physical, mental exhaustion and other health problems. The foremost reason for all these problems are unawareness, hoary techniques of performing task, incompatibility of the technology and attitudinal constraints such as instinctive conservatism and confrontation to change.

Women are lagging behind in the use of improved technology and equipments at farm. It was pointed out in a study that various agricultural projects were formulated keeping in mind men with the assumption that they would automatically give advantage to women though men have different physiological and ergonomical characteristics than women [2]. The tools or equipment which are designed considering men's physiological, anthropometric and ergonomical parameters, increase work load and occupational disorders in spite of decreasing, if not fit for the women. According to Armstrong (1983)[1], inappropriate design and excessive use of hand tools were found associated with increased incidence of both acute and sub-acute cumulative trauma of hand, wrist and fore arm. Designing and standardizing appropriate tailor made tools and equipment for women can reduce or entirely prevent physical fatigue, which is linked with farm work. Hence, the present investigation is designed with the broad objective to equip farm women technologically for reducing their drudgery during engagement in agriculture and for enhancing their productivity.

Materials and Methods

The present research paper is a part of RKVY sponsored research project, which was carried out during 2010 to 2013. Three villages namely Lodpa, Nilpur and Malivas were chosen purposively among RKVY adopted villages from Dantiwada

taluka. Lodpa was selected amongst the villages having maximum number of large farmers, Nilpur was chosen amongst the villages having maximum number of medium farmers, and Malivas was selected amongst the villages having maximum number of small farmers, to ensure representation of all the categories of farmers in the sample. Fifty farm women from each selected village were selected for conducting the research using simple random sampling.

Development of tool

An exhaustive reviewing of the literature assisted and enabled the investigator for development of the tool. An interview schedule was prepared to get information under various heads as given below-

- Demographic profile of farm women,
- Agricultural and live stock activities performed by farm women,
- Their perception of agricultural and livestock activities with regard to work load,
- Factors affecting drudgery,

Measurement of heart rate and energy expenditure

Heart rate (bpm) and energy expenditure (KJ/min) were recorded by Metamax (Telemetry Metabolic Analyzer), which directly measures the above mentioned parameters.

Result and Discussion

This section deals with the findings obtained by the analysis of data collected from 150 farm women. The findings have been supported by relevant discussion and interpretations.

Background information of farm women

Background information was collected under three heads, i.e., age, family type and annual income of the family (Rs)-



Plate 1: Measurement of heart rate and energy expenditure during maize shelling activity with the help of maize sheller



Plate 2: Measurement of heart rate and energy expenditure during weeding activity with the help of improved plastic handle sickle



Plate 3: Measurement of heart rate and energy expenditure during ridge and furrow making activity with the help of hand ridger



Plate 4: Measurement of heart rate and energy expenditure during groundnut decorticator activity with the help of groundnut decorticator

Table-1 Distribution of farm women according to their background information (n=150)

Sr. No.	Background Information	n	Percentage (%)	
1	Age	15-25	47	31.3
		26-35	56	37.3
		36-45	27	18.0
		46-55	15	10.0
		55 above	5	3.3
2	Family type	Joint	84	56.0
		Nuclear	65	43.3
		Extended	1	.67
3	Annual Income of the Family (In Rs)	<1 Lakh	89	59.3
		1-2 Lakh	31	20.7
		2-3 Lakh	16	10.7
		>3 Lakh	14	9.3

- The [Table-1] reveals that age of farm women ranged from 15 to 55 years and above. Though maximum farm women belonged to the young age group, i.e., 26 to 35 years (37.3 %) and 15-25 years (31.3 %), old farm women were also involved in performing agricultural activities.
- Family type was categorized as joint, nuclear and extended family. It was found that maximum farm women belonged to Joint family (56); little less than half of the farm women belonged to the nuclear family.
- Annual Income of the family ranged as less than 1.0 lakh (Rs), 1-2 lakh (Rs), 2-3 lakh (Rs) & greater than Rs 3 lakh (Rs). It was found that almost

59 % of the families were having >100000 (Rs) annual income, whereas 20.7 % of the respondents were having between 1 to 2 lakh (Rs), 11 % of the families were having 2 to 3 lakh (Rs), While only about 9 % of the families were having income more than 3 lakh (Rs) in a year.

Agricultural activities performed by farm women

Further, the investigator tried to get an idea about different agricultural and allied activities performed by farm women.

Table-2 Distribution of farm women according to agricultural activities performed (n=150)

S.N	Activities	Agricultural and livestock activities performed by farm women		
A	Agricultural activities	f	%	
1	<i>Land preparation</i>			
	Leveling and making ridges and furrow	75	50.0	
	Clod breaking	72	48.0	
	Digging	119	79.3	
	Ploughing	106	70.7	
	Harrowing	59	39.3	
	2	<i>Sowing and Transplanting</i>		
		Seed treatment	91	60.7
		Sowing	110	73.3
		Transplanting	76	50.7
Seed production / vegetative propagation		76	50.7	
Layout and seed bed		68	45.3	
3	<i>Crop - care</i>			
	Planting	74	49.3	
	Manuring /Fertilizer	105	70.0	
	Irrigation	102	68.0	
	Gap filling and re sowing / thinning	20	13.3	
4	<i>Weeding and inter culturing</i>			
	Weeding and inter culturing	71	47.3	
	<i>Harvesting</i>			
	Harvesting of grain	97	64.7	
	Picking and cutting	83	55.3	
	Vegetable plucking	44	29.3	
5	<i>Post harvesting</i>			
	Fruit picking	20	13.3	
	Planking	46	30.7	
	Shelling	50	33.3	
	Stripping	26	17.3	
	Decortications	69	46.0	
	Sieving grain	38	25.3	
	Threshing and winnowing	102	68.0	
	Drying / sun drying of grain	108	72.0	
	Value addition of pulses, potato etc	25	16.7	
B	<i>Live stock activities</i>			
	Fodder collection	145	96.7	
	Cleaning and care of animal	145	96.7	
	Cleaning animal shed	145	96.7	
	Dung collection	144	96.0	
	Disposing of animal dung	144	96.0	
	Making dung cake	144	96.0	
	Milking of animals	144	96.0	

[Table-2] shows that farm women were performing a wide range of agricultural and livestock activities. Digging, sowing, manuring, drying of grain and various livestock activities were being performed by majority of the farm women. Though smaller number farm women were involved in various post harvest operations, i.e. stripping (17.3%), value addition (16.7%), sieving grain (25.3%) and fruit (13.3%) and vegetable harvesting (29.3%). The results are in fine tune with a study conducted by Aggrawal et al. (2013) [4], which pointed out that majority of the farm women were performing various agricultural tasks such as cleaning of field, raising nursery seedling, sowing, transplanting, harvesting of crop and cutting of grass, threshing, winnowing, cleaning and drying of grains in Jammu and Kashmir State.

It can be said that women are playing a noteworthy role in Indian agriculture in various parts of the country. Not only agriculture, other allied sectors such as animal husbandry is also a domain where women are participating more actively than men. It is essential to mention here that farm women have to take the burden of family-work, child care, animal care etc. along with the agricultural work.

Perceived work load of farm women

Some activities can be perceived as difficult to perform, moderate and light activity by farm women according to work load.

Table-3 Distribution of farm women according to their perception of agricultural and livestock activities (n=150)

S.N	Activities	Perception of agricultural and livestock activities with regard to work load					
		Difficult to perform		Moderate activity		Light activity	
A	Agricultural activities	n	%	n	%	n	%
	<i>Land preparation</i>						
	Leveling and making ridges and furrows	74	98.7	1	1.3	0	0
	Clod breaking	66	91.7	6	8.3	0	0
	Digging	109	91.6	10	8.4	0	0
	Ploughing	98	92.5	7	6.6	0	0
	Harrowing	50	84.7	9	15.3	0	0
	<i>Sowing and Transplanting</i>						
	Seed treatment	51	56	40	43.9	0	0
	Sowing	107	97.3	3	2.7	0	0
	Transplanting	74	97.3	2	2.7	0	0
	Seed production / vegetative propagation	22	28.9	53	69.7	1	1.3
	Layout and seed bed	18	26.5	50	73.5	0	0
	Planting	65	87.8	9	12.2	0	0
	<i>Crop – care</i>						
	Manuring /Fertilizer	61	58	36	34.3	8	7.7
	Irrigation	59	57.8	36	35.2	7	7
	Gap filling and re sowing / thinning	15	75	3	15	2	10
	Weeding and inter culturing	62	87.3	9	12.7	0	0
	<i>Harvesting</i>						
	Harvesting of grain	86	88.7	11	11.3	0	0
	Picking and cutting	76	91.7	7	8.3	0	0
	Vegetable plucking	35	79.5	9	20.5	0	0
	Fruit picking	20	100	0	0	0	0
	Planking	46	100	0	0	0	0
	<i>Post harvesting</i>						
	Shelling	50	100	0	0	0	0
	Stripping	24	92.3	2	7.7	0	0
	Decortications	65	94.2	4	5.8	0	0
	Sieving grain	26	68.4	12	31.6	0	0
	Threshing and winnowing	80	78.4	11	10.9	1	.9
	drying / sun drying of grain	65	60.2	42	38.8	1	.9
	Value addition of pulses. potato etc	20	80	5	20	0	0
B	<i>Live stock activities</i>						
	Fodder collection	118	81.3	27	18.7	0	0
	Cleaning and care of animal	101	69.7	44	30.3	0	0
	Cleaning animal shed	102	70.3	43	29.7	0	0
	Dung collection	74	51.3	70	48.8	0	0
	Disposing of animal dung	86	59.7	58	40.3	0	0
	Making dung cake	79	54.9	65	45.1	0	0
	Milking of animals	93	64.6	51	35.4	0	0

It was observed that land preparation activities such as leveling and making ridges and furrows, clod breaking, digging and so on were perceived as difficult to perform activities by majority of the farm women. Sowing, transplanting and planting were perceived as difficult to perform activities by majority of the farm women while seed treatment, seed production, layout and seed bed preparation were perceived as moderate activities by almost half of the farm women. Under crop care activities sowing and weeding were perceived as difficult to perform activities while manuring and irrigation were perceived as moderate and light activities by little less than half of the farm women. All the activities related to harvesting were perceived as difficult to perform by the majority of farm women. Same results were found for the post harvesting operations. Majority of the farm

women perceived post harvest operations as difficult to perform activities. For the livestock activities, dung collection and making dung cake were perceived as moderate activities by little less than half of the farm women while rest of the activities were categorized as difficult to perform by majority of the farm women. It can be concluded that most of the agricultural activities and livestock were perceived as difficult to perform by majority of the farm women. This can be due to inadequate posture, long duration of exhaustive and repetitive work and lack of sufficient rest. Mrunalini and Snehlata (2010) [3] stated that women ranked harvesting, weeding inter-cultivation and threshing as the most drudgery prone tasks as per priority. Further, Gandhi et al. (2009) pointed out that work stress was higher in threshing and winnowing activities amongst post harvest operations due

load carrying for much longer duration.

Factors affecting drudgery

Various factors are responsible for drudgery during the task performance. In case of agricultural tasks, factors causing drudgery were reported as time involved during agricultural activity, manual loads, lack of sufficient rest, inadequate posture, exhaustive work, difficult work process by the farm women.

Table-4 Distribution of farm women according to factors quoted affecting drudgery (n=150)

S. No.	Factors affecting Drudgery	N (150)	Percentage (%)
1.	Time involved during agricultural activity	6	4.0
2.	Manual loads	73	48.7
3.	Lack of sufficient rest	132	88.0
4.	Inadequate Posture	105	70.0
5.	Exhaustive work	31	20.7
6.	Difficult work process	36	24.0

Present study pointed out that majority of the farm women quoted insufficient rest (88 %) as a factor affecting drudgery. Other factors reported by farm women were

inadequate posture (70 %), manual loads (49 %), exhaustive work (21 %), difficult work process (24 %) and Time involved during agricultural activity (4 %) in descending order. It can be inferred from the results that farm women were performing very time and labor demanding, tedious, repetitive and more drudgery prone activities. These activities were mostly done manually by farm women as they were not exposed to improved tools. Mrunalini and Snehalatha (2010) [3] found that work in agriculture was demanding on time and this factor contributed to drudgery experiences of men and women.

Drudgery reducing tools and equipments

Various drudgery reducing tools and equipment namely hand ridger, improved sickle, groundnut decorticator and tubular maize sheller were introduced among farm women. Among them, some of the tools were used in crop production activities while others were used in post harvest handling and processing. At the outset, farm women were trained to use those tools and equipment efficiently. Then these were given to different group of farm women to use.

Hundred per cent farm women appreciated the improved sickle as it was light weight and not required to sharpen it. It was designed in such a way that fingers of worker could not be touched to the ground which prevented fingers and palm to be scratched or injured.

Table-5 Performance data of drudgery reducing tools

Sr. No.	Drudgery reducing tools	Average Resting Heart Rate (bpm)	Resting VCO ₂ (l/min)	Average Working Heart rate (bpm)	Working VCO ₂ (l/min)	Outcome of Tools/ Equipments	Average Heart rate in traditional practice
I	Hand Ridger	92	0.35	139	1.09	300 m ² /h	155
II	Sickle	102	0.32	124	0.70	-	124
III	Groundnut Decorticator	92	0.35	116	0.64	33 kg./h.	92
IV	Tubular Maize Sheller	91.6	0.35	97	0.49	27 kg./h.	93

Though, average working heart rate of farm women using improved sickle and conventional sickle was found same. Singh et al. (2014) [5] found that average working heart rate was more while farm women used serrated sickle as compared to local sickle but working efficiency was increased. It was found that average working heart rate of farm women had reduced from 155 beats per min to 139 beats per min, while using hand ridger as compared to traditional practice. It prevented farm women from working in bad posture for making ridges. In

traditional method, women have to prepare ridges in a bending position while through hand ridger, two women can prepare ridges of equal distance in standing posture. Women feel less physiological fatigue in standing posture as compared to the bending posture. Average working heart rate of farm women was found more in case of groundnut decorticator and tubular maize sheller as compared to their average working heart rate in traditional practice.

Table-6 Energy expenditure (KJ/min) using drudgery reducing tools

S. No.	Drudgery reducing tools	Energy expenditure (KJ/min) in traditional practice	Energy expenditure (KJ/min) using drudgery reducing tools
i.	Hand Ridger	15.925	13.381
ii.	Sickle	10.996	10.996
iii.	Groundnut Decorticator	5.908	9.724
iv.	Tubular Maize Sheller	6.067	6.703

Energy expenditure of farm women did not increase significantly by using drudgery reducing tools as compared to working in traditional manner, whereas output increased significantly. On the other hand, almost 26 per cent increment was observed in the heart rate of farm women while using groundnut decorticator but output also increased ten times than the traditional method. As far as hand ridger is concerned, about 10% saving in heart rate increment was recorded. It shows that farm women were spending less energy and getting more output by using hand ridger.

Correlation among different variables

Correlation analysis was done to find out relationship among different variables such as drudgery perception of farm women in agricultural activities and livestock activities, use of tools by them, health hazards and so on.

Drudgery perception of farm women in agricultural activities and livestock activities was significantly negative correlated with their yearly income and socio-economic

status, whereas significantly positive correlated with agricultural activities performed by them. Further, health hazards perceived by farm women were found negatively correlated with their yearly income as well as socioeconomic status while positively correlated with extent of agricultural activities performed by them. This may be attributed to the fact that farm women with high income and SES may use more improved tools and equipment for performing various activities. High income and SES was significantly negative correlated with extent of agricultural activities performed by farm women. Farm women with high SES may not involve in rigorous agricultural activities and they may get them done by laborers. Health hazards perceived by farm women were also found negatively correlated with the use of improved tools and technologies in agricultural and livestock activities. Surprisingly, age was not significantly correlated with any variable.

It can be surmised from the results that use of improved tools and technologies in agricultural and livestock activities can dwindle to their drudgery while performing these activities. Thereby health hazards in agriculture and allied sector can also be controlled to some extent.

Table-7 Correlation between different variables

Variables	DP in AA	DP in LA	HH	Yearly Income (in thousands)	SES	Extent of AA performed by FW	Use of improved tools/tech. in AA	Use of improved tools/tech. in LA
DP in AA	1	0.306**	0.383**	-0.500**	-0.568**	0.767**	-0.544**	-0.605**
DP in LA	0.306**	1	0.268**	-0.286**	-0.298**	0.209*	-0.403**	-0.414**
HH	0.383**	0.268**	1	-0.283**	-0.389**	0.323**	-0.415**	-0.445**
Age	-0.088	0.016	0.109	0.044	-0.059	-0.040	-0.147	-0.152
Yearly Income (in Thousands)	-0.500**	-0.286**	-0.283**	1	0.546**	-0.442**	0.360**	0.441**
SES	-0.568**	-0.298**	-0.389**	0.546**	1	-0.519**	0.466**	0.536**
Extent of AA performed by FW	0.767**	0.209*	0.323**	-0.442**	-0.519**	1	0.337**	0.399**
Use of improved tools/tech. in AA	-0.544**	-0.403**	-0.415**	0.360**	0.466**	0.337**	1	0.980**
Use of improved tools/tech. in LA	-0.605**	-0.414**	-0.445**	0.441**	0.536**	0.399**	0.980**	1

(DP=Drudgery Perception, AA = Agricultural activities, LA= Livestock activities, SES=Socioeconomic Status)

Conclusion

A large number of women are working in agriculture and performing strenuous tasks. Majority of the agricultural and allied activities were perceived as difficult to perform by the farm women. Drudgery reducing tools and equipment are proved to be a boon for farm women. These tools and equipment reduced drudgery of farm women as well as increased their efficiency and work output. Working in better posture also decreased the prevalence of musculoskeletal disorders among farm women. The results obtained in the study are pointer to the fact that designing and modifying farm tools and equipments tailor made for women of Gujarat is indispensable in the interest of farm women.

Conflict of Interest: None declared

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