Anthropometric Data Analysis and Constraints faced by Women in Operating Agricultural Machinery

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Abstract: Even though women are capable of carrying out all the works that men can do but there are some certain high physiological cost demanding physical works in the agricultural field that need to be carried out by men only. It is strange to know that women are facing difficulties in carrying out farm mechanization works. The survey conducted using the structured interview schedule gave an insight into the constraints faced by women agricultural workers. Workers were asked to rank the predetermined constraint which was evaluated using the Garrett's ranking method. It was evident from the results obtained that lack of awareness about the machines and its controls together with lack of training and extension services prevented the women workers from benefiting from mechanization. Also, financial dependence, gender gap, difficulty in operating machines and exclusion from power and decision making were ranked 2nd, 3rd, 4th and 5th by the workers, respectively. The women workers were also worried about the technical knowhow of the machines as most machines required frequent troubleshooting and maintenance. The comparison made on the anthropometric data showed that out of the twenty six anthropometric parameters involved just ten parameters viz. buttock popliteal height, elbow rest height, wall to acromion , shoulder grip length, thigh clearance sitting, hip breadth sitting, grip diameter, grip span and span akimbo have higher values for female workers than that of the male workers. The exerting force required to operate machinery controls were significantly different. Hence there was urgent need to develop women friendly designs that will suit women anthropometric measurements which will be incorporated into the machines so as to make Indian women workers or operators comfortable with the use of agricultural machines and tractors.

Keywords: Women, farm mechanization, constraints, Garrett's ranking method, anthropometry, leg force, pedal force sensor

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1 Introduction

The 2015-16 Agriculture Census record of India showed that about 11.72% of the total operated area in the country was managed by female agricultural workers. The Agriculture sector employs 80% of active women where 32% of them works under the labour force and the remaining 48% of them serves as self-employed farmers (Mahila Kisan Shaktikaran Pariyojana [MKSP], 2016). Moreover the 2017-18 economic survey report says that men are migrating from rural to urban areas for other jobs, meaning there is 'feminization' in the agriculture sector, with the increasing number of women serving in multiple roles as cultivators, entrepreneurs, and labourers. For example, the Bihar's agriculture sector is highly

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feminized, with 50.1% of the total workforce engaged in farming activities (ADRI, 2014). It is evident that about 60-80% of their food were produced by rural women (OXFAM, 2018). Also, 70% of all women engaged in cultivation are from households (IHD, 2014). In India the quantification of women's contribution to agriculture and food production cannot be accurate. Agriculture is carried out by labour contributions from both men and women in a collaborative manner (Doss, 2011). For example, if men are typically provided the labour to prepare the fields, women will be engaged in both planting and weeding the crops. At the same time both men and women will be involved in the harvesting operation. The percentage of agricultural workers to the overall workers in India was 59.1% in 1991. While the expected percentage of agricultural workforce in 2033 is 49.9% which shows that in future there will be decline in agricultural labour force. At the same time statistics shows that women workers as percentage of agricultural workers in 1991 were 35.1% and by 2033 it will increase to 39.6% (Tiwari et al., 2019). Besides Mehta et al., (2014) reported that the population of the agricultural workers to the overall workers in 1991 was 59.1 million which then declined to 40.6 million in 2020. In same way as the population of women workers which increased from 35.1 million in 1991 to 45 million in 2020. This shows that in India women workers will lead their agricultural work force in future. There is the urgent need to educate and encourage women workers in India to be actively involved in agricultural field and its allied activities.

It is a known fact that women workers are facing a lot of difficulties in most activities involved in the agricultural field as they are not trained to operate agricultural machineries and they are also not familiar with their controls. Majority of these agricultural machineries are being operated by men workers, while the women workers are faced with the difficulty of operating them. It is anticipated that as of today, about 20% of male workers act as controllers of machines and 80% as a source of power. In the case of women workers, the corresponding figures are 1% and 99% as a source of power (Mehta et al., 2018).

Today the situation has changed such that human labour has been replaced with machines due to the contribution of farm mechanization. These machines are now become the active labour in the agricultural field. Hence proper design of machine that will match the human capability is necessary for determining the optimum performance of any man-machine system (Victor et al., 2002). In view of this an anthropometric data is needed during the design and development of agricultural machines. This study mainly focuses on women workers and their anthropometric capabilities to operate farm machinery.

2 Materials and Methods

The Characterisation of the constraints faced by women agriculture workers was carried out by conducting a preliminary survey among them. Important constraints were listed and evaluated by means of Garrett's ranking method. Anthropometric parameters required for tractor workspace design were identified and measured at the laboratory. Anthropometric data (static and dynamic) for both men and women workers were analyzed and comparison was also done on the data obtained.

2.1 General survey among the women workers

A general survey form was prepared and a structured interview was held among women agricultural workers who are actively participating in the different agricultural activities at Regional Agricultural Research Station (RARS), Tirupati. The survey was carried out with 30 female agricultural workers coming under the age group of 25 to 55. The preliminary data designed for obtaining relevant information for this study include operations involved; tools and machines used for various operations, duration of work and cost of labour.

2.2 Garrett's ranking Method

The Garrett's ranking method, according to Dhanavandhan (2016) and Arya and James (2020), is an easy method which can be used to identify major problems or most important constraints out of several identified constraints.

The constraints identified in the survey were ranked based on their priority by these workers. The two steps were followed for ranking these involve:

Assigning of rank to each identified constraint according to the worker's priority.

Finding out the percent position value of all the constraint using the expression given in Equation (1).

$$\textit{Percent position} = [R_{IJ}\text{-}0.5]/N_{ij}x100 \ \% \quad (1)$$

where, R_{ij}: the rank given for the i^{th} factor by the j^{th} worker, N_j is the number of factors ranked by the j^{th} worker

The score values corresponding to the estimated percent positions were found out from Garrett's Table. The mean of the score values were found and the constraint which has the highest mean value was considered as the most important constraint.

2.3 Measurement of anthropometric parameters

Measurement was carried out to identify the anthropometric parameters that fit to the design of general purpose tractor workspace. An effort was taken to compare the required anthropometric data using both men and women agricultural workers. Anthropometric measurements were carried out on 10 male workers and 10 female workers worked as tractor operator and agricultural farm labours at RARS, Tirupati. The age of selected workers lies between 25 and 48 years. Twenty six (26) anthropometric parameters including leg strength were required for the design of tractor operator workspace. These parameters were identified and measured at the laboratory. The observations were noted carefully as the dimensions were measured in correct posture. The workers involved were asked to stand on a flat surface to take vertical dimensions. Moreover other dimensions were measured in sitting posture as the workers involved were asked to sit with their body vertically erected, while their shoulders and head were touching the same vertical plane. The measurements were recorded using a metric scale and anthropometry.

For leg strength measurement a set up was developed at RARS, Tirupati. A pedal force sensor of 100 kg capacity made by Texon Corporation, Mumbai along with a load cell indicator was used to measure the applied force on the pedals by the workers involved. The workers were asked to sit up on the seat arranged in the set up. The position of the seat can be adjusted in both horizontal and vertical directions. The seat height was adjusted from 30 cm to 40 cm at every 5cm interval. Also, the horizontal distance of the Seat Reference Point (SRP) from the pedal location was varied from 35% to 50% of worker's stature at 5% interval (Mehta *et al*., 2007). The measured data was statistically analyzed using mixed factorial Analysis of Variance (ANOVA) to know the effect of different variables such as leg, gender, seat height and horizontal distance of SRP from pedal position on leg strength exerted on pedal by the worker.

3 Results and discussion

The survey conducted using the structured interview schedule gave an insight into the constraints faced by the women agricultural workers. The important operations which women workers intended to do were sowing, weeding, irrigation, harvesting and post-harvest operations like threshing, drying etc. Whereas men workers were busy with land preparation and handling of different machines. Workers were asked to rank the predetermined constraints as shown in Table 1. Which was evaluated using the Garrett's ranking method.

The following constraints were identified during the structured interview conducted for the women workers. These constraints are gender gap (GG), land ownership

issues (LOI), financial dependence (FD), lack of awareness on machines (LAM), social constraints (SC), lack of training and extension services (LTES), exclusion from power and decision-making (EPD), difficulty in operating machines (DOM), discrimination in paying wages (DPW), poor institutional support (PIS), inappropriate technology (IT), insufficient education (IE) and exclusion from research (ER).

Table 1 Ranking of constraints by the workers

S/No.	Constraints	Rank given by the workers				
		1st	2nd	3rd	4th	5th
1	GG	5	4	0	1	0
2	LOI	1	4	2	1	2
3	FD	5	4	1	0	0
4	LAM	8	2	0	0	0
5	SC	4	3	2	1	0
6	LTES	8	2	0	0	0
7	EPD	5	3	2	0	0
8	DOM	4	4	2	0	0
9	DPW	3	4	1	0	2
10	PIS	2	4	2	2	0
11	IT	3	1	3	2	1
12	IE	2	3	1	4	0
13	ER	2	1	3	2	2

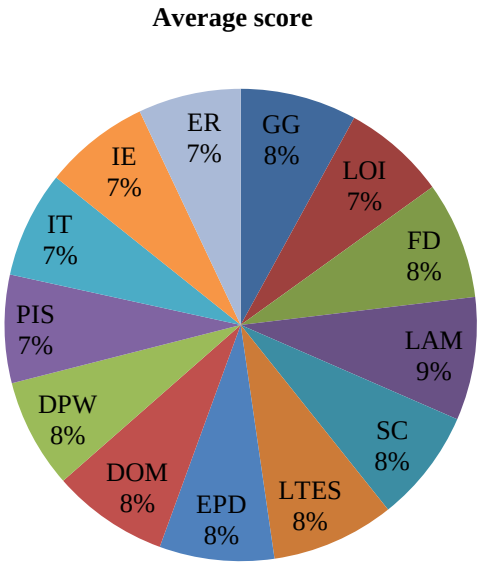

Figure 1 Average score obtained for different Factors

Table 2 Ranking result for each constraint

Sl. No.	Constraints	Rank
1	LAM	1th
2	LTES	1th
3	FD	2nd
4	GG	3rd
5	DOM	4th
6	EPD	5th
7	SC	6th
8	DPW	7th
9	PIS	8th
10	IT	9th
11	IE	10th
12	LOI	11th
13	ER	12th

The average score obtained for these identified constraints are shown in Figure 1 while the Garrett's Rank obtained for each constraint is presented in Table 2. It was evident from the results obtained in Table 2 that LAM and LTES ranked the same thing. This was because women were not informed about the different machines available for various operations such as land preparation, intercultural operation, sowing, harvesting and post-harvest technologies. Moreover these women were not considered as potential work force at all. Because of this, majority of women workforce do not have exposure to these machines which also is responsible for their lack of training in operating these machines as emphasized by the rank given to LTES in Table 2 which prevented these women workers from enjoying the benefits of mechanization.

In the rural areas of India, financial independency for women to procure or hire farm machines was not there which resulted in ranking FD as the third most critical factor. FD, GG, DOM and EPD were ranked 2nd, 3rd, 4th and 5th by these workers, respectively. The workers were also worried about the technical knowhow of the machines as most machines required frequent repairs and maintenance. It is obvious from the results obtained that women are not involved in decision making, hence the average score for EPD was 76.2. Other factors involved have scored that ranged from 75 to 68 which resulted in ranking them from 6th to 12th position.

Table 3 Constraints and their possible solutions

Constraint	Possible solution
LAM	Training program exclusively for women workers on different agricultural machines
LTES	Training program and workshop on different agricultural machines
FD	Financial support schemes from Government sector and promote income generating activities
GG	Sensitize men about women's contribution
DOM	Ergonomic consideration of women in the design of machines
EPD	Effort to increase women's access to resources
SC	Women empowerment programs and skill development trainings
DPW	Equal payment for equal work
PIS	High impact policies and projects for women empowerment
IT	Consideration of women capabilities and promote them to come forward
IE	Education policies for illiterate women
LOI	Joint ownership and leveraging credit for women
ER	Women oriented research programs

Source: Arya and James (2020)

Possible solutions to resolve the existing constraints were presented in Table 3. Several policies have been put in place in the past by the Government to mechanize farm activities. But none of them were meant for women. These policies were formulated to keep the women abilities aside and promoting that of men in doing more work (Theis et al., 2018).

In order to find out most important constraint faced by the women agricultural workers while operating a prime mover such as that of a tractor, a separate interview schedule was prepared and analyzed using the Garrett's ranking method. The survey was conducted among 20 woman agricultural workers who are having experience with tractor operation and having age fewer than 25 to 40. The preference was given to those woman agricultural workers who are well fit and good in health conditions.

The following constraints were identified as the tractor operation related constraints from the structured interview held with the woman agricultural workers.

(1) Operating Mechanical Steering(OMS)

(2) Operating Power Steering (OPS)

(3) Clutch Pedal Operation (CPO)

(4) Brake Pedal Operation (BPO)

(5) Accelerator Operation (AO)

(6) Hand Lever Operation (HLO)

(7) Dash Board Operation (DBO)

(8) Front mounted Implement Operation Viewing(FOV)

(9) Rear mounted Implement Operation Viewing (ROV)

(10) Seating Arrangement (SA)

Table 4 Ranking of constraints by the workers

S/ No.	Constraints	Rank given by the workers									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1	OMS	0	0	0	3	4	2	0	1	0	0
2	OPS	0	0	0	0	0	1	0	0	4	5
3	CPO	9	1	0	0	0	0	0	0	0	0
4	BPO	3	7	0	0	0	0	0	0	0	0
5	AO	0	0	0	0	3	2	2	0	2	1
6	HLO	0	0	0	0	0	3	2	0	1	4
7	DBO	0	0	0	0	0	0	1	7	2	0
8	FOV	0	0	6	4	0	0	0	0	0	0
9	ROV	0	2	7	1	0	0	0	0	0	0
10	SA	0	0	2	3	3	0	0	0	0	2

Table 5 Final rank of each constraint

Sl. No.	Constraints	Rank
1	CPO	1st
2	BPO	2nd
3	ROV	3rd
4	FOV	4th
5	OMS	5th
6	SA	6th
7	AO	7th
8	DBO	8th
9	HLO	9th
10	OPS	10th

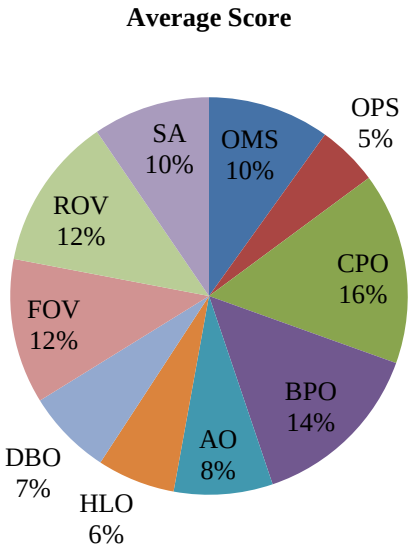

Figure 2 Average score obtained for different tractor related constraints

The final ranks obtained for the different tractor operation related constraints were presented in Table 4 and Table 5. The average score obtained by using Garrett's ranking method was represented in Fig.2. It was clearly evident from the Fig.2 that the CPO was discovered as the most important constraint that these women workers were facing while operating the tractor. It was ranked first among other constraints identified. Also, the BPO ranked second.

Presented in Table 6 was the anthropometric data collected for both men and women agricultural workers at RARS, Tirupati. Tractors were designed to operate

by men workers. The tractor's workspace and controls were designed based on the men's anthropometric capabilities as contained in Table 6. The clutch pedals are more often used than the brake pedals. The 5th percentile value of left leg strength sitting of an Indian male agricultural worker was taken for design purpose which is equal to 247 N. Compared to men, women have less strength i.e., 164 N. Most of tractors use mechanical clutch system. This requires higher effort to operate the pedal. Considering these facts, it was necessary to modify the existing mechanical clutch system to a much easier system so that women worker could easily operate the clutch pedal. Likewise, the 5th percentile value of right leg strength of an Indian male agricultural worker was taken for design purpose which is equal to 261 N, whereas, for female worker the right leg strength is 172 N. The maximum actuating force required for operating the brake pedal should be less than 260 N. To reduce the brake pedal exertion power required, the alternate system needs to be developed and properly incorporated into the tractor braking system so as to operate brake with a reduced physical force without compromising the braking effect.

Table 6 Anthropometric data of male and female agricultural workers

Body dimension	Male							Female						
	Mean	SD	CV (%)	Percentile			DBP	Mean	SD	CV (%)	Percentile			DBP
				5th	50th	95th					5th	50th	95th	
Weight, kg	70.40	9.94	14.11	59.45	70.00	85.30	25.85	58.20	8.99	15.45	45.45	59.50	68.65	23.20
Stature	174.40	8.97	5.14	162.15	181.00	181.10	18.95	156.80	8.47	5.40	148.45	152.00	167.00	18.55
vertical reach	217.00	17.52	8.07	194.00	225.50	231.50	37.50	201.50	8.32	4.13	193.45	197.50	211.55	18.10
Biacromial breadth	27.30	2.98	10.93	24.45	26.00	32.00	7.55	24.40	1.05	4.30	23.00	24.00	25.78	2.78
Sitting eye height	75.10	1.52	2.03	73.45	74.50	77.00	3.55	72.60	3.10	4.27	68.35	72.00	76.55	8.20
Popliteal height sitting	45.50	3.34	7.34	42.00	46.00	47.60	5.60	42.00	3.43	8.17	37.45	42.50	46.10	8.65
Buttock Popliteal length	43.10	4.70	10.91	36.00	46.00	46.10	10.10	44.20	1.03	2.34	43.00	44.00	45.55	2.55
Hip breadth	39.40	3.66	9.28	33.70	41.50	42.00	8.30	34.70	2.11	6.08	32.45	34.50	37.55	5.10
Interscye breadth	39.80	0.42	1.06	39.00	40.00	40.00	1.00	36.10	2.02	5.61	33.45	36.50	38.55	5.10
Acromial height sitting	62.30	4.16	6.68	56.05	63.00	66.00	9.95	55.60	1.51	2.71	53.45	55.50	57.55	4.10
Elbow rest height	24.00	1.83	7.61	22.00	24.00	27.00	5.00	28.20	2.90	10.28	23.70	29.00	31.00	7.30
Wall to acromion	9.50	0.53	5.55	9.00	9.50	10.00	1.00	12.80	0.92	7.18	11.45	13.00	14.00	2.55
Shoulder grip length	70.30	4.35	6.18	67.00	69.00	78.00	11.00	76.10	4.75	6.24	68.80	75.50	81.00	12.20
Elbow grip length	36.30	2.00	5.52	33.00	37.00	38.00	5.00	40.90	4.36	10.65	35.00	42.00	46.20	11.20
Thigh clearance sitting	8.00	0.00	0.00	8.00	8.00	8.00	0.00	9.70	1.06	10.92	8.45	10.00	11.10	2.65
Knee height sitting	53.60	2.37	4.41	52.00	53.00	58.00	6.00	48.40	3.41	7.04	44.45	48.00	52.55	8.10
Buttock knee length	53.20	4.49	8.44	48.00	52.00	59.00	11.00	50.90	1.20	2.35	49.45	51.00	52.55	3.10
Foot length	24.00	1.33	5.56	22.00	24.00	26.00	4.00	22.90	1.31	5.71	21.45	22.50	24.78	3.33
Foot breadth	5.2	0.42	8.12	5	5	6	1	9.00	0.00	0.00	9.00	9.00	9.00	0.00
Heel breadth	11.50	0.53	4.58	11.00	11.50	12.00	1.00	4.30	0.26	6.00	4.00	4.50	4.50	0.50
Hip breadth sitting	38.90	5.06	13.02	33.9	37	46	12.1	32.75	2.42	7.38	30.00	32.00	36.00	6.00
Grip diameter	7.15	0.24	3.38	7.00	7.00	7.50	0.50	95.30	9.29	9.74	83.90	92.00	106.55	22.65
Grip span	8.10	0.74	9.11	7.00	8.00	9.00	2.00	49.50	11.47	23.18	38.45	46.00	65.55	27.10
Hand breadth across thumb	12.05	0.83	6.90	11.00	12.00	13.00	2.00	10.95	0.16	1.44	10.73	11.00	11.00	0.28
Span akimbo	71.80	6.03	8.40	64.00	75.00	77.20	13.20	84.80	3.68	4.33	80.00	86.00	89.00	9.00
Functional leg length	87.40	3.98	4.55	83.45	86.00	93.00	9.55	79.30	5.48	6.91	72.90	78.50	86.65	13.75

Note:Key: DBP= Difference between 5th and 95th percentile. All dimensions are in cm unless it is specified.

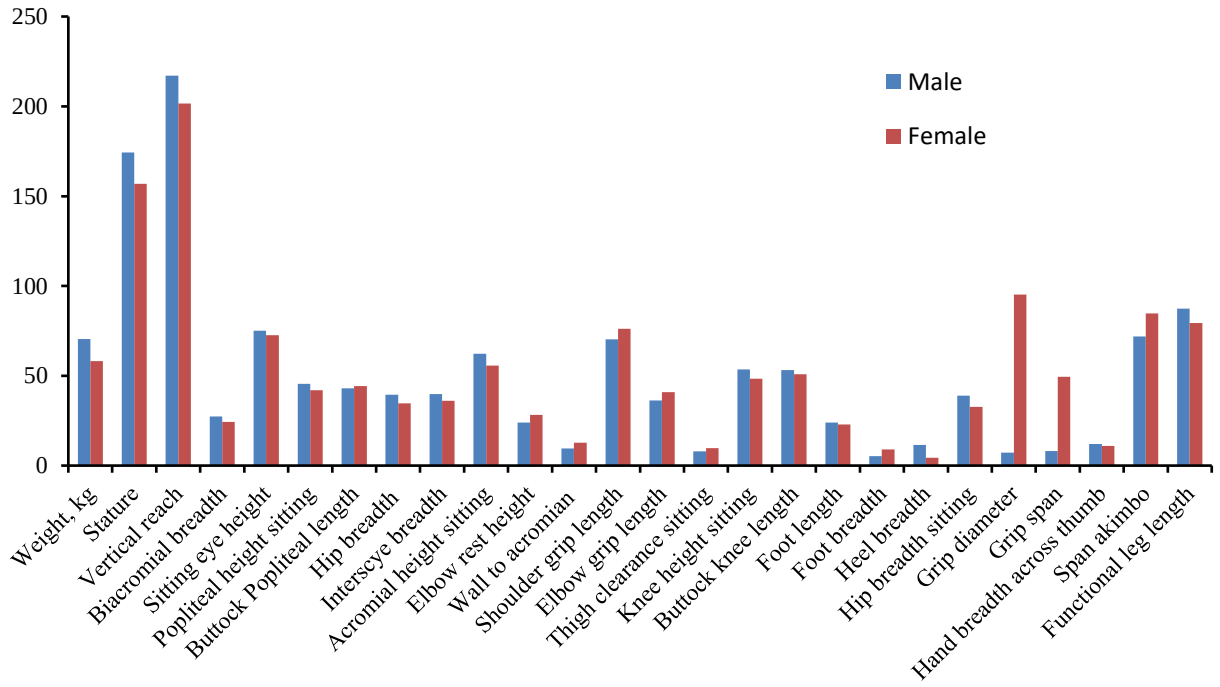

Figure 3 Comparison of anthropometric data of male and female agricultural workers

The rear and front mounted implement operation viewing ranked third and fourth position, respectively. The tractor implements and equipment were attached either to the rear side or front side of the tractor. In order to monitor the effect of operation at rear side, operators need to twist their trunk and monitor the effect at the rear side. This was found to be a very cumbersome process which the operator could not attain the desired outcome. This is important and a system needs to be developed for monitoring the rear side operation without turning back while driving the tractor. Operating the mechanical steering and the seating arrangement were found to be quite difficult for women workers which made them to be ranked fifth and sixth position respectively. The remaining constraints which include AO, HLO, DBO and OPS were ranked seventh, eighth, ninth and tenth respectively.

It is necessary to empower women to do all the agricultural activities which are now being carried out by men. In order to encourage them to come forward, it is needed to modify the equipment workspace according to their capabilities.

The analyses of anthropometric data for both male and female agricultural workers were presented in Figure 3. The comparison made on this data showed that out of twenty six anthropometric parameters involved only ten parameters viz. buttock popliteal length, elbow rest height, wall to acromion, shoulder grip length, elbow grip length, thigh clearance sitting, foot breadth, grip diameter, grip span and span akimbo have higher values for female workers than male workers. The remaining sixteen mean values were found to be higher for the male workers. The average statures of male and female workers were 174.40 cm and 156.80 cm, respectively. The difference between 5^{th} and 95^{th} percentile value was also given in Table 6, which was found to be helpful in defining the possibility of an adjustable design of farm equipments.

The Average value of data may not be sufficient to design equipment since it only represents the size of a person who had that value. So to have proper design of equipments to suit majority of the users, the concept of percentiles such as 5^{th} and 95^{th} percentile values should be used (Yadav et al., 2000 ;Gite et al., 2009). Since male workers were considered as the operator of

tractors and other equipments, their anthropometric data was taken prominently for the workspace design. But due to dearth in number of male agricultural workers, it is necessary to mechanize each and every operations of the agricultural production system. The available work force and willing to work in the agricultural sector are the "rural women". Hence to harness the rural women energies towards the operation of these agricultural machines and tractors, the design must be women friendly. To comfortably operate these machineries and tractor comfortably by women workers, it is necessary to modify the tractor workspace to suit with the functional anthropometric data of rural women.

Considering some of the aspects in Table 6, the difference between male and female workers was about 20 cm in 95th percentile found in vertical reach. Hence required designs modification must be incorporated. Similarly knee height sitting is about 6 cm which should be considered for designing operator seat. More importantly functional leg length difference was about 7 to 10 cm, which is essential in the designing of control pedals. It is advisable to consider women capabilities for the design of tractor operator workspace. The acquired data and its comparison might be the helpful lead to this modification.

Table 7 ANOVA table of leg strength data

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	467208.296[a]	149	3135.626	6.735	.000
Intercept	5845098.252	1	5845098.252	12553.897	.000
REP	169184.807	9	18798.312	40.374	.000
L	11812.736	1	11812.736	25.371	.000
L * REP	1085.460	9	120.607	.259	.985
G	66936.246	1	66936.246	143.763	.000
G * REP	71281.313	9	7920.146	17.011	.000
H	1861.447	2	930.724	1.999	.137
H * REP	16286.778	18	904.821	1.943	.012
X	42150.620	3	14050.207	30.177	.000
X * REP	37060.135	27	1372.598	2.948	.000
L * G * REP	1088.679	10	108.868	.234	.993
H * X * REP	48460.075	60	807.668	1.735	.001
Error	153648.095	330	465.600		
Total	6465954.643	480			
Corrected Total	620856.391	479			

Note: Key:R^2= 0.753; Adjusted R Squared = 0.641;Dependent Variable= Pedal force; REP = Replications;L= Right or left leg; G= Gender; H= Seat height; X= Horizontal distance of SRP from the pedal position.

It is obvious from the Table 7 that there was a significant difference between the strength value of left and right legs ($p=0 <0.05$). Majority of the selected workers were right handed persons which might be the reason why they applied more force with their right leg. The mean leg strength of male and female workers ($p=0<0.05$) also significantly different that indicates the difference in strength parameters of male and female workers. Thus it revealed that women workers need considerations separately while designing agricultural machineries.

Leg strength was analysed by changing seat height and horizontal distance of SRP from the pedal position. The results obtained showed that seat height was significantly affected by the leg strength values since p value is equal to 0.012 which is less than 0.05. Also the horizontal distance of SRP from pedal position significantly ($p= 0<0.05$) affected the leg strength

exerted by the workers.

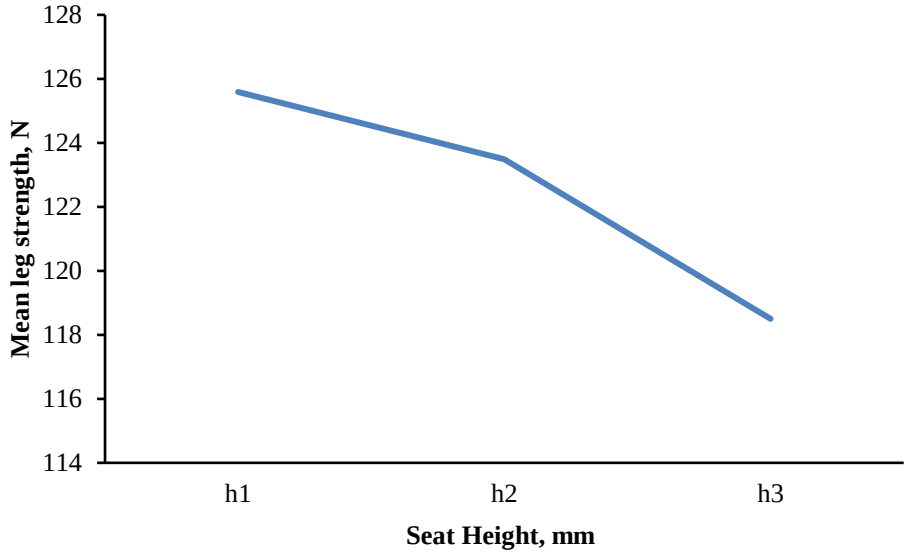

Figure 4 Variation of leg strength data with seat height (Note: h1= 300 mm, h2=350 mm and h3=400 mm)

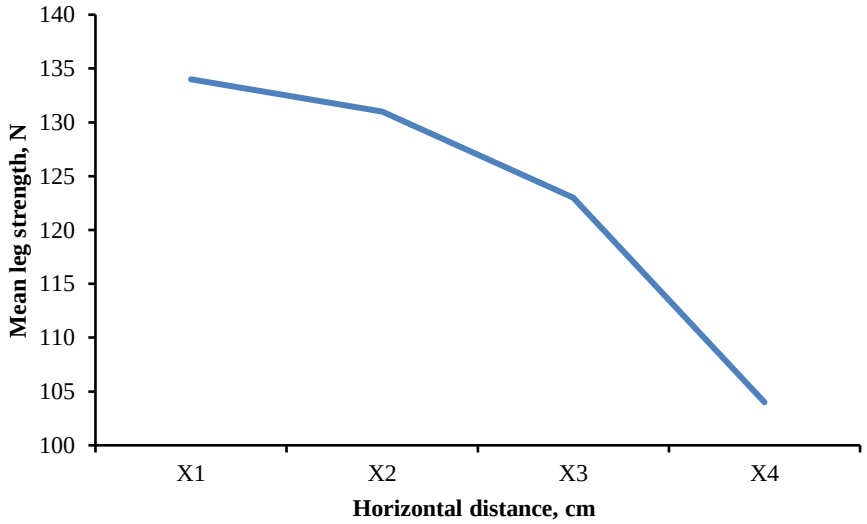

Figure 5 Variation of leg strength data with horizontal distance of SRP from pedal position (Note: X1= 35%S, X2=40%S, X3=45%S and X4=50%S)

The variation of mean leg strength with respect to seat height was shown in Figure 4. As the seat height increased from 30 cm to 40 cm there was a decrease in leg strength. Similarly from the figure 5 it was evident that as the horizontal distance of SRP increases from 35%S to 50%S, mean leg strength was decreasing and at 50%S it was clear that the subject was unable to exert required force upon the pedal. The reduction in leg strength with increase in seat height and increase in horizontal distance of SRP from pedal position might be due to the thigh compression and loss of back support (Mehta et al., 2007).

4 Conclusion

Women are equally capable of carrying all the works that men do in the agricultural field. But to operate these machines and tractors comfortably by women workers become a difficult task for them due to improper workspace design and the difference in their anthropometric capabilities. It is necessary to re-design the workspace to suit both men and women anthropometric capabilities. Female worker do faces lot

of constraints in the activities pertaining to agricultural field. LAM and LTES were found to be the most important constraints as they were both ranked first position by these women workers. Likewise, CPO was found as the major constraints that restrict the women workers from operating farm tractors. Results obtained from both comparison made on the anthropometric data and leg strength analysis reveal the need to embark on an ergonomic evaluation of an existing farm equipment and tractor workspace, so that it can be re-designed to suit the anthropometric capabilities meant for both men and women.

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