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## PREVALENCE OF MUSCULOSKELETAL DISCOMFORT IN AGRICULTURAL OPERATIONS AMONGST FARM WOMEN OF DANTIWADA TALUKA

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### ABSTRACT

Rural women perform varieties of farm operations like sowing, transplanting, weeding, threshing, winnowing, storing and processing of grains. Chowdhury and Singh (2007) opined that the agricultural activities like reaping of crops, storage of food grains, storage of seeds and processing of grains were mostly done by women. Winnowing and threshing being hard work were least preferred by the women. Most of the farm activities performed by women are drudgery prone and affect their health adversely. As women are involved in many agricultural and allied activities, it leads to many health hazards mainly musculoskeletal disorders like strain/sprain, neck pain, shoulder pain, back pain, accidents like cut/wounds, scratches, injury leading to surgical treatment, fatal injuries, knee injuries, tendon disorders. Hence, the present study was planned with following objectives- 1. To study personal and socioeconomic profile of rural women 2. To identify prevalence of musculoskeletal discomfort amongst farm women. Present study was conducted in villages of Dantiwada Taluka in Banaskantha district, Gujarat. A representative sample of 200 farm women was selected randomly from four villages. An interview schedule was formed which comprised questions related to background information, personal and socio-economic variables of farm women. Body part discomfort scale was used to assess pain in body parts after performing agricultural and allied activities. Findings- Analysis of data shows pain in lower back and knees amongst maximum farm women during performing weeding activity. Almost half of the farm women had muscle strains and low back injuries. During fodder cutting women felt pain in lower back. In milking activity, palm/fingers and shoulders were affected the most. The data are pointer to the fact that ergonomic interventions should be done to improve posture of farm women and to prevent musculoskeletal disorders amongst them.

**Key words :** Body part discomfort scale, Farm women, Musculoskeletal discomfort.

### Introduction

#### Women in agriculture

In rural India, almost half of rural female workers are classified as agricultural labourers and 37.00% as cultivators. About seventy per cent of farm work was performed by women. Thus, it aptly justifies that majority of the farmers in India are women (Dash, 2000).

Economic Survey 2017-18 says that with growing rural to urban migration by men, there is 'feminization' of agriculture sector, with increasing number of women in multiple roles as cultivators, entrepreneurs and labourers.

Women as a significant human resource can play their role effectively if they are provided equal opportunities and status as those of the men. Aggregate data showed that women comprise about 43.00% of the agricultural labour force globally and in developing countries (FAO, 2011).

Women do many of the most difficult farm tasks in India such as transplanting, weeding, harvesting and post-harvest processing of produce. All of these tasks are time consuming and full of drudgery (Gupta and Bisht, 2018).

Moreover, according to the data of World Bank

(2013), global female labour force participation is around 50.00% but, in fact, less value is given to their contributions and rural women are less likely to realize their capacity to make a life better for themselves, families and communities (Akinsanmi, 2005).

### **Musculoskeletal disorders amongst farm women**

Kroemer (1989) defined the musculoskeletal disorder as a term that referred to the range of conditions characterized by pain, numbness or discomfort, impairment that involve the muscles, the nerves, tendons, the joints and other soft tissues of the body.

Hagberg *et al.* (1995) investigated that work-related musculoskeletal disorders (WMSDs) developed gradually as a result of repeated trauma.

Nga (1995) conducted the study in Vietnam and found that heavy physical work was common and load carried on the head were found to have a detrimental effect on the vertebrae of workers especially in the neck region.

Back pain and pain in shoulders, arms and hands were the most common symptoms reported by farmers (NIOSH, 2001). Women reported more symptoms in the neck, upper back and upper extremities than men (Hildebrandt, 1995).

Borah *et al.* (2001) reported that 70.00% farm women experienced severe pain in the shoulder joints and 68.00% had low back pain due to long hours of bending while uprooting of paddy seedlings.

Walker-Bone and Palmer (2002) assessed musculoskeletal disorders in farmers and farm workers. There was weaker, but suggestive evidence that farmers more often had knee OA (Ostio arthritis) and LBP (Low back pain) than workers in occupations with fewer physical demands.

Das and Gangopadhyay (2005) stated that work-related musculoskeletal disorders (WMSDs) usually occurred when there was a mismatch between the physical requirement of the job and physical capacity of human body. Musculoskeletal disorders (MSDs) are important causes of work incapacity and loss of work days.

With repetitive motions and awkward postures, the tissues surrounding nerves become swollen and squeeze or compress nerves. Compression of a nerve causes muscle weakness, sensations of “pins and needles” and numbness. Dryness of skin, and poor circulation to the extremities, may also occur (Rizzo, 2007).

Lipscomb *et al.* (2008) investigated upper extremity musculoskeletal problems among women employed in poultry processing. They identified difficulty to maintain

work speed or quality due to musculoskeletal symptoms. The authors concluded from the results that the pattern of risk was consistent with onset of early musculoskeletal problems among women who were new to the industry followed by a later increase with continued exposure as age increased.

Naidoo *et al.* (2009) investigated the prevalence and factors associated with musculoskeletal pain in 911 women working in small scale agriculture in rural northern KwaZulu-Natal. In total, 67.00% women reported any chronic musculoskeletal pain. The 12-month prevalence of pain ranged from 63.90% to 73.30% and the prevalence of specific chronic pain lasting more than 3 months Review of literature 9 ranged from 42.80% to 48.30%. Older age, carrying heavy loads, working with hands above shoulder height and frequently squatting and kneeling were the causing factors associated with chronic musculoskeletal pain.

Singh and Arora (2010) concluded that a considerable number of adverse health conditions, including musculoskeletal disorders are linked to agricultural work. Prioritization of researches based on prevention of farm women from musculoskeletal disorders, development of new technologies for women for critical field problems such as hand cutting of plant materials, stooped posture and lifting and carrying of heavy materials, funding and support for awareness and prevention programmes for musculoskeletal disorders are required.

Osborne *et al.* (2011) examined prevalence of musculoskeletal disorders among farmers. Life time prevalence of any form of MSD among farmers was 90.6% while one-year MSD prevalence was 76.90%. Life time LBP prevalence was 75.00% while one-year LBP prevalence was 47.80%. The next most common regional MSDs reported were upper (range 3.6 – 71.4%) and lower extremities (range 10.4 – 41%).

Gandhi *et al.* (2011) conducted research on ergonomic evaluation for dung collection and transportation. A rural woman adopted unnatural body postures during the activity putting undue stress on her body. On an average she fetched one iron basket as head load having its weight ranging from 18 kg to 25 kg each in the morning as well as in the evening. She spent 52 minutes in morning and 43 min in the evening for dung collection and transportation, travelling a distance of 1.49 km/day for a cycle. Physiological stress indicated that heart rate increased to 127 bpm over the resting HR (84 bpm) for the activity. Extreme postural deviation was observed, while collecting dung and lifting dung as head load. Musculoskeletal problems exhibited severe pain in

low back followed by mid back, upper back, upper arms, shoulder joints, head and neck.

Davis and Kotowski (2012) concluded that farmers and farm workers experienced high rates of low back, shoulder, and upper extremity disorders. Musculoskeletal disorders may disproportionately affected farm youth and migrant workers due to the types of farm tasks performed. An urgent need was felt for improved and validated interventions to reduce exposures and to improve the health of farmers and farm workers.

Chandra and Parvez (2016) concluded that continuation of work for long working hours was the main cause of MSD amongst farm women doing agricultural tasks. The results showed that the prevalence of MSDs was very high among the farm workers and the most affected area were back, knees, shoulder, neck, hand, wrist, thighs, legs and foot. It has been recommended that workers should avoid bad work postures, should take rest period in between the working hours and avoid long working hours as far as possible during their work for reducing job related health problems.

## Materials and Methods

The present study entitled, “Prevalence of Musculoskeletal Discomfort in Agricultural Operations amongst Farm Women of Dantiwada Taluka” was conducted through following well defined and systematic research procedure which is discussed below under the following sub-heads.

- Research design
- Operational definitions
- Conceptual Framework
- Sample size and sampling Procedure
- Tools for data collection
- Statistical analysis of data

### Research design

Ex post facto research design was used to conduct present study.

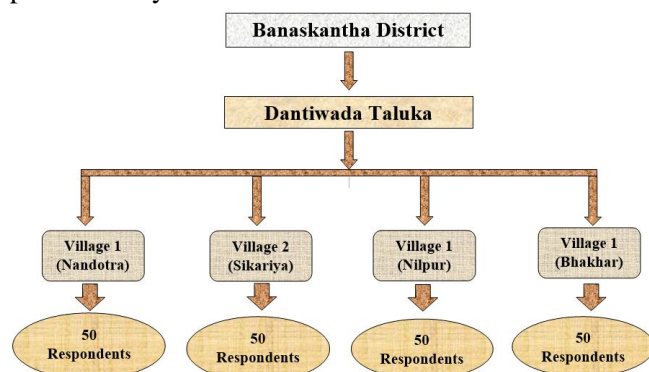


Fig. 1 : Research Design.

### Operational definitions

- **Musculoskeletal discomfort:** Musculoskeletal discomfort means pain and/or discomfort at least once in at least one body part of the following during the previous 12 months; neck, shoulder, upper back, elbow, lower back, wrist/hand, hips/thighs, knee, or ankle/feet.
- **Farm women:** A farm woman is operationally defined as a rural woman, who is involved in agricultural and livestock activities.

### Conceptual Framework

Personal and socio-economic characteristics of farm women were studied as independent variables like age, education, caste, religion, marital status and family structure, income of family, occupation of family, size of family, ownership of livestock, land holding and types of assets. Musculoskeletal discomfort among farm women was studied as the dependent variable.

### Sample size and sampling procedure

Multistage random sampling was used for selection of respondents. There are fifty-six villages in Dantiwada taluka. Out of these, four villages were selected randomly. From each village, fifty respondents were randomly selected. Hence, total sample size was 200.

### Tools for data collection

Following tools were used for data collection:

**Interview schedule:** pre-structured interview schedule was used for collection of data. The interview schedule consisted of three parts-

- First part comprised of personal and socio-economic characteristics of farm women.
- Body part Discomfort Scale was used to assess musculoskeletal discomfort while performing agricultural or allied activity.

### Statistical analysis of data

Data was analyzed by applying descriptive statistics such as percentage (%) and frequency. The standard IBM SPSS 20 software was used to analyze the data.

## Results and Discussion

This chapter deals with the findings and discussion of the results which have been found after the analysis of data. The data collected were classified, tabulated and analyzed as per the stated objectives of the study. Descriptive statistical tools were used for the analysis of the data. Interpretations of the results and their discussion have been presented on the basis of results obtained.

**Table 1 :** Distribution of respondents on the basis of personal and socio-economic characteristics (n = 200).

S. no.	Age (years)	f	%
1	Young (18-30)	39	19.50
2	Lower middle age (31-45)	136	68.00
3	Upper middle age (46-60)	23	11.50
4	Old age	02	1.00
Total		200	100.00
S. no.	Education	f	%
1	Illiterate	80	40.00
2	Primary level (up to 5 <sup>th</sup> standard)	72	36.00
3	Middle level (from 6 to 9 standard)	27	13.50
4	Secondary level (up to 10 <sup>th</sup> standard)	17	8.50
5	Higher secondary level (up to 12 <sup>th</sup> standard)	04	2.00
Total		200	100.00
S. no.	Religion	f	%
1	Hindu	200	100.00
2	Muslim	0	0
3	Other	0	0
Total		200	100.00
S. no.	Caste	f	%
1	General	25	12.50
2	OBC (Other backward caste)	149	74.50
3	SC	26	13.00
4	ST	0	0
Total		200	100.00
S. no.	Family structure	f	%
1	Joint family	200	100.00
2	Extended family	0	0
3	Living without children	0	0
4	Nuclear family	0	0
Total		200	100.00
S. no.	Family size	f	%
1	Small (up to 4 members)	40	20.00
2	Medium (5-8 members)	160	80.00
3	Large (above 8 members)	0	0

Total		200	100.0
S. no.	Occupation	f	%
1	Farming + Animal Husbandry	149	74.50
2	Farm Labour	22	11.00
3	Farming + Animal Husbandry + Service	29	14.50
Total		200	100.0
S. no.	Family monthly income ( ` )	f	%
1	Below 10,000/-	12	6.00
2	` 10,000/- to 25,000/-	85	42.50
3	` 25,000/- to 40,000/-	68	34.00
4	` 40,000/- to 65,000/-	32	16.00
5	` 65,000/- to 80,000/-	03	1.50
6	Above ` 80,000/-	0	0
Total		200	100.0
S. no.	Ownership of livestock	f	%
1	Small herd size (1-5 animal)	135	67.50
2	Large herd size (more than 5 animals)	65	32.50
Total		200	100.00
S. no.	Land Holding Size	f	%
1	No land	11	5.50
2	Marginal Farmers (1.0 to 2.5 acres)	62	31.0
3	Small Farmers (2.6 to 5.0 acres)	79	39.50
4	Medium Farmers (5.1 to 10.0 acres)	39	19.50
5	Large Farmers (>10.0 acres)	09	4.50
Total		200	100.00
S. no.	Types of dwellings possession for their livestock	f	%
1	No dwelling	06	3.00
2	Thatched/Kuccha	56	28.00
3	Pucca	138	69.00
Total		200	100.00
S. no.	Marital Status	f	%
1	Married	171	85.50
2	Unmarried	04	2.00
3	Window	25	12.50

Table 1 continued...

Table 1 continued...

		Total	200	100.00
S. no.	Types of Assets	<i>f</i>	%	
1	Wooden plough	69	34.50	
2	Improved disc plough	0	0	
3	Tractor tiller/ on rent	100	50.00	
4	Land leveler	03	1.50	
5	Pump set	45	22.50	
6	Hand tools	185	92.50	
7	Sprayer/duster	03	1.50	
8	Chaff cutter	0	0	
9	Thresher	06	3.00	

women had completed higher secondary level education.

All the respondents (100.0%) belonged to the Hindu religion. Caste is an important feature of the social structure and it was taken as a variable. Caste wise distribution of respondents as emerged from the present study illustrates that respondents 74.50% belonged to OBC (Other Backward Class) caste category followed by general category (12.50%) and SC (Schedule Caste) category (13.00%). No respondent belonged to ST (Schedule Tribe) caste category.

The family structures were categorized as joint, extended, living without children and nuclear family. It was found that 100.00 per cent respondents were having joint family.

The analysis of data related to family size shows that majority (80.00%) of the respondents belonged to

Table 2 : Distribution of farm women according to body part discomfort score during weeding (n=200).

Types of activity	Very severe		Severe		Moderate		Mild		Very mild		No pain	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Shoulder	3	1.50	4	2.00	2	1.00	18	9.00	2	1.00	171	85.50
Upper back	0	0	0	0	4	2.00	10	5.00	4	2.00	182	91.00
Upper arms	0	0	0	0	1	0.50	4	2.00	0	0	195	97.50
Elbows	0	0	0	0	0	0	4	2.00	0	0	196	98.00
Lower arms	0	0	0	0	0	0	0	0	1	0.50	199	99.50
Lower back	7	3.50	22	11.00	46	23.00	58	29.00	22	11.00	45	22.50
Wrist	1	0.50	0	0	3	1.50	1	0.50	0	0	195	97.50
Palm/Fingers	0	0	0	0	3	1.50	0	0	0	0	197	98.50
Knees	17	8.50	28	14.00	42	21.00	43	21.50	24	12.00	46	23.00
Legs	0	0	1	0.50	2	1.00	3	1.50	2	1.00	192	96.00
Ankle/feet	0	0	0	0	0	0	2	1.00	0	0	198	99.00

### Personal and socioeconomic profile of rural women

In the present study, the personal and socio-economic characteristics of farm women were studied and depicted in Table 1. Frequencies and percentages were calculated for the study variables *viz.*, age, education, caste, religion, marital status, family structure, income of family, occupation of family, size of family, ownership of livestock, land holding and types of assets.

The results revealed that 68.00% farm women belonged to lower middle age group (31-45 years) followed by 19.5 per cent young (18-30 years) age group, 11.50% upper middle age (46-60 years) group and the age group of farm women was old age (above 60 years) which was one per cent of the total.

According to the present investigation, 40.00% farm women were illiterate, 36.00% had primary level education, 13.50% had middle level education, 8.5 had secondary level education and only 2.00 per cent farm

the medium-size family followed by small-size family (20.00%). The findings lead to the conclusion that respondents preferred to have small or medium size family.

It is evident from the analysis that occupation of majority (74.50%) of the respondents was farming and animal husbandry both, while 14.50 per cent of respondents were doing farming, animal husbandry and service and 11.00 per cent respondents were farm laborers. The findings illustrate that respondents were mostly belonging to farming and animal husbandry.

Monthly income of the respondents' family was classified into six categories of income group. Majority of the respondents (42.50%) were obtaining ` 10,000/- to ` 25,000/- monthly family income followed by 34.00 per cent who were getting ` 25,000/- to ` 40,000/- monthly family income. 16.00% were getting ` 40,000/- to ` 65,000/- monthly family income. Six per cent were getting below ` 10,000/- monthly family income. Only

**Table 3 :** Distribution of farm women according to body part discomfort score during fodder cutting (n=200).

Types of activity	Very severe		Severe		Moderate		Mild		Very mild		No pain	
	f	%	f	%	f	%	f	%	f	%	f	%
Neck	0	0	0	0	1	0.50	0	0	0	0	199	99.50
Shoulder	0	0	2	1.00	11	5.50	36	18.00	4	2.00	147	73.50
Upper back	0	0	0	0	1	0.50	3	1.50	1	0.50	195	97.50
Upper arms	0	0	0	0	0	0	4	2.00	0	0	196	98.00
Elbows	0	0	0	0	0	0	1	0.50	0	0	199	99.50
Lower arms	0	0	0	0	0	0	0	0	1	0.50	199	99.50
Lower back	13	6.50	32	16.00	67	33.50	41	20.50	15	7.50	32	16.00
Wrist	0	0	2	1.00	1	0.50	2	1.00	0	0	195	97.50
Palm/Fingers	1	0.50	0	0	3	1.50	1	0.50	0	0	195	97.50
Thighs	0	0	1	0.50	0	0	0	0	1	0.50	198	99.00
Knees	17	8.50	36	18.00	41	20.50	39	19.50	16	8.00	51	25.50
Legs	0	0	0	0	4	2.00	10	5.00	3	1.50	183	91.50
Ankle/feet	0	0	0	0	0	0	1	0.50	0	0	199	99.50

**Table 4 :** Distribution of farm women according to body part discomfort score during milking (n=200).

Types of activity	Very severe		Severe		Moderate		Mild		Very mild		No pain	
	f	%	f	%	f	%	f	%	f	%	f	%
Shoulder	0	0	0	0	15	7.50	73	36.50	37	18.50	75	37.50
Upper back	0	0	0	0	0	0	0	0	0	0	200	100.00
Upper arms	0	0	0	0	0	0	1	0.50	0	0	199	99.50
Elbows	0	0	0	0	0	0	8	4.00	10	5.00	182	91.00
Lower arms	0	0	0	0	1	0.50	1	0.50	0	0	198	99.00
Lower back	1	0.50	0	0	10	5.0	15	7.50	5	2.50	169	84.50
Wrist	1	0.50	2	1.00	0	0	3	1.50	1	0.50	193	96.50
Palm/Fingers	2	1.00	7	3.50	64	32.00	49	24.50	40	20.00	38	19.00
Thighs	0	0	0	0	0	0	0	0	0	0	200	100.00
Knees	2	1.50	7	3.50	10	5.00	10	5.00	8	4.00	163	81.50
Legs	0	0	0	0	3	1.50	6	3.00	8	4.00	183	91.50
Ankle/feet	0	0	0	0	1	0.50	0	0	0	0	199	99.50

1.50 per cent respondents belonged to the income group of ` 65,000/- to ` 80,000/- family monthly income. The findings lead to the conclusion that monthly family income of majority of the respondents was not more than ` 40,000/-.

The analysis of data related to ownership of livestock shows that respondents (67.50%) owned small herd size (1-5 animal) followed by large herd size (more than 5 animals) *i.e.*, 32.50%.

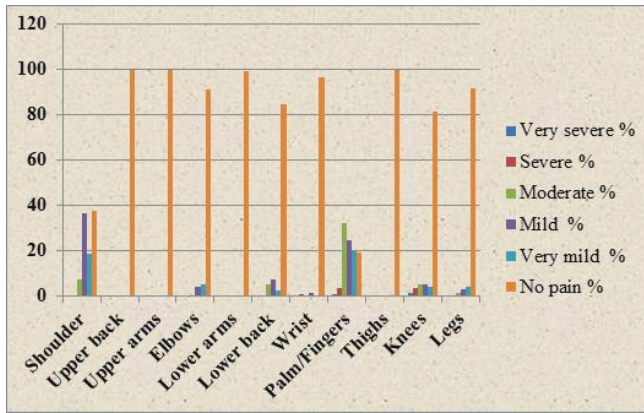
Land holding size of the respondents was classified into five categories. Respondents (39.50%) were small farmers (2.6 to 5.0 acres) followed by 31.00 per cent who were marginal farmers (1.0 to 2.5 acres). About twenty per cent were medium farmers (5.1 to 10.0 acres) and very few (5.50%) had no land. Only 4.50% respondents belonged to the category of large farmers

(>10 acres). The findings lead to the conclusion that land holding of majority of the respondents was small and marginal farmers.

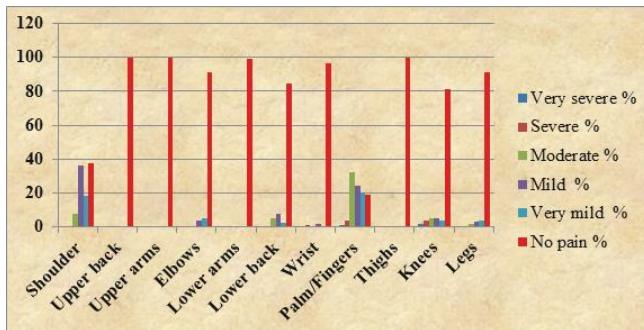
The analysis of data related to type of dwelling possession for their livestock shows that respondents (69.00%) had pucca dwelling for their livestock followed by kuccha dwelling (28.00%); while very few (3.00%) possessed no dwelling for their livestock hence kept them in open area.

The analysis of data related to marital status shows that majority (85.50%) of the respondents were married followed by widow (12.50%) and very few (2.00%) were unmarried.

It can be inferred from the Table 1 that (92.50%) farm women had hand tools followed by tractor/ tiller (50.00%), wooden plough (34.50%) and pump set



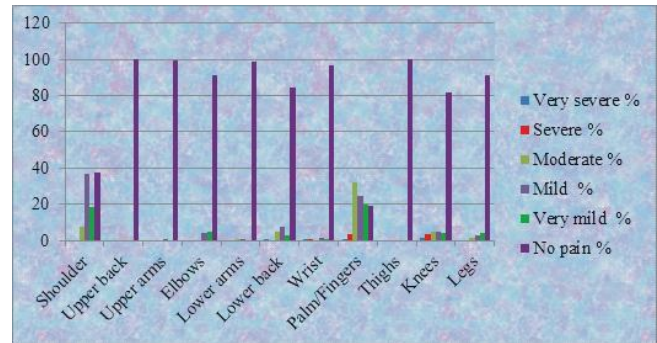
**Fig. 2 :** Distribution of farm women according to body part discomfort scale during weeding.



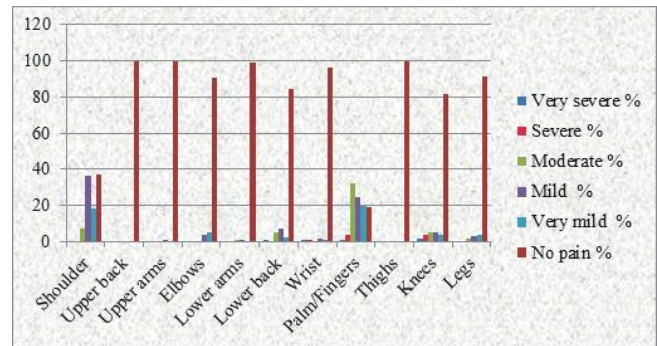
**Fig. 3 :** Distribution of farm women according to body part discomfort scale during Fodder cutting.

(22.50%). Very few i.e. only three per cent farm women possessed thresher and very few had assets like Land leveler & Sprayer/Duster (1.50%).

Data presented in Table 2 reflects that pain was reported by farm women in lower back and knees while weeding. It was found that pain in lower back was very mild (11.00%), mild (29.00%), moderate (23.00%), severe



**Fig. 4 :** Distribution of farm women according to body part discomfort scale during Milking.



**Fig. 5 :** Distribution of farm women according to body part discomfort scale during Cleaning of animal shed.

(11.00%) and very severe (3.50%) amongst almost three-fourth of the total farm women (77.50%). As far as knees are concerned, nearly twenty per cent farm women felt moderate and mild pain while 14.00% had severe and 8.5% had very severe pain. Though, other body parts of the farm women also got affected during performing weeding activity such as shoulder, upper back, legs and so on.

Data in Table 3 shows that farm women felt pain in

**Table 5 :** Distribution of farm women according to body part discomfort score during cleaning of animal shed (n=200).

Types of activity	Very severe		Severe		Moderate		Mild		Very mild		No pain	
	f	%	f	%	f	%	f	%	f	%	f	%
Neck	0	0	0	0	0	0	0	0	0	0	200	100.00
Shoulder	0	0	0	0	5	2.50	25	12.50	31	15.50	139	69.50
Upper back	0	0	0	0	0	0	1	0.50	1	0.50	198	99.00
Upper arms	0	0	0	0	0	0	2	1.0	0	0	198	99.00
Elbows	0	0	0	0	0	0	5	2.50	25	12.50	170	85.00
Lower arms	0	0	0	0	0	0	1	0.50	0	0	199	99.50
Lower back	2	1.00	9	4.50	16	8.00	41	20.50	11	5.50	121	60.50
Wrist	0	0	1	0.50	1	0.50	0	0	1	0.50	197	98.50
Palm/Fingers	0	0	0	0	0	0	0	0	0	0	200	100.00
Thighs	0	0	0	0	0	0	0	0	0	0	200	100.00
Knees	3	1.50	12	6.00	11	5.50	18	9.00	30	15.00	126	63.00
Legs	0	0	0	0	7	3.50	18	9.00	21	10.50	154	77.00
Ankle/feet	0	0	0	0	0	0	2	1.00	0	0	198	99.00

lower back *i.e.*, very severe (6.50%), severe (16.00%), moderate (33.50%), mild (20.50%) and very mild (7.50%) while performing fodder cutting activity.

Knees were the next affected body parts while cutting fodder. 18.00% felt severe pain and 8.5% felt very severe pain in knees while cutting fodder. Only one-fourth farm women did not report any pain while in knees. Shoulder was also affected in this activity. Other body parts were less affected in this activity.

Data in Table 4 shows that in milking activity, palm/fingers and shoulders were affected the most. Eighty-one per cent farm women reported pain in their palm or fingers after milking amongst them 32.00% had moderate pain followed by mild pain (24.50%).

Farm women had moderate (7.50%) and mild pain (36.50%) in the shoulder also after milking. It was also found that very few of them *i.e.* 3.5 per cent felt severe pain in knees and palm or fingers after milking.

As far as cleaning of animal shed is concerned, seven and half per cent farm women had severe and very severe pain in their knees after the activity while about five per cent had severe and very severe pain in their lower back. Looking to the data, lower back was found the most affected body part followed by knees and shoulder after cleaning of animal shed.

### Conclusion

The present research was conducted to study socio-economic characteristics of farm women and prevalence of musculoskeletal discomfort amongst farm women. Majority of farm women suffered from back and knee pain. Poor posture of farm women during farm and livestock activities leads to pain in their body parts and joints. It is necessary to analyze the posture of farm women while performing these activities and to make necessary corrections for improving the posture. Besides, farm women are also engrossed in lifting and carrying activities that need to be analyzed from health point of view.

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