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Original Article

Prevalence of work-related musculoskeletal disorders among dairy farmers in Malur Milk Co-operative Society, Kolar District, Karnataka, India

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ABSTRACT

Introduction: The burden of work-related musculoskeletal disorders (WRMSDs) is high among dairy farmers, as they are involved in unacceptable working postures and movements. This study aims to assess the prevalence of WRMSDs and their associated factors among dairy farmers in Malur Milk Co-operative Society, Kolar District, Karnataka, India.

Methods: A cross-sectional study was done from February 2022 to April 2022, among 150 dairy farmers aged 18 years and above. We collected socio-demographic, occupation, ergonomics and co-morbidities related details by administering a questionnaire. Assessment of musculoskeletal disorders was by Standardized Nordic Questionnaire and Mental health was assessed by Patient Health Questionnaire (PHQ-9).

Results: The mean age was 40.96 ±13.49 years, and 66% of our study participants were males. The secondary occupation was agriculture(63%). Working hours per day was more than 8 hours in 19.3%. History of lifting heavy weights(78%), standing for long hours (56%) and sitting in squatting positions for long hours(66%) was present in this occupational group. The prevalence of WRMSDs was found to be 64.7%. The site of musculoskeletal disorders was found to be highest in the lower back (48.7%) and knees(45.3%). On multivariate analysis, belonging to the male gender [aOR = 0.33 (95%CI: 0.12-0.85)] and prolonged standing [aOR = 3.39 (95%CI: 1.46-7.89)] were the risk factors for WRMSDs.

Conclusion: The prevalence of WRMSD is significantly high among dairy farmers in rural areas, affecting the lower back and knees predominantly. Education on ergonomics, routine physical activity, and accessibility to social security schemes will improve the health status of this community.

Keywords: Dairy farmers, Mental health, Unorganized sector, Work-related musculoskeletal disorders.

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Introduction

Farmers and farm workers are exposed to several work-related conditions that may have an impact on their safety and health, making agriculture one of the three most dangerous professions in the world. It is commonly recognized that dairy farming, specifically milking, is physically hard and is a risk factor for developing Musculoskeletal Disorders(MSD).[1] MSDs are defined as a group of disorders that affect the musculoskeletal system including the nerves, tendons, muscles and supporting structures such as intervertebral discs.[2] Work Related Musculo Skeletal Disorder (WRMSD) enumerates musculoskeletal conditions that are caused by trauma or related to unacceptable working postures, excessive force, lifting heavy weights, or movements. The burden of MSDs is high among dairy farmers.[3] MSDs can result in poor quality of life and hence reduce productivity. It is prevalent universally without any difference in developed or developing countries.[4] Therefore, the risk factors involved in WRMSDs among dairy farmers must be addressed. This study aims to assess the prevalence of WRMSDs and the associated factors among dairy farmers in Malur Milk Co-operative Society, Kolar District, Karnataka, India.

Methods

A cross-sectional study was conducted in a town named Malur which is one of the taluk headquarters in the Kolar district of Karnataka state in India, over 2 months, from February 2022 to April 2022. Malur is located about 30 kilometers away from Bangalore. The main economic sectors in this region are business, agriculture, and livestock. Ragi, maize, vegetables, and flowers are the major crops cultivated here. Numerous people in this area raise cattle and they sell the milk to the milk co-operative society and locally. Dairy farmers registered in the milk co-operative society have the benefits of availing loans and equipment required for livestock rearing is available at a subsidized price. The study was done among dairy farmers aged 18 years and above, who sell their milk to the Malur Milk Co-operative Society.

A sample size of 150 was calculated considering relative deviate at a 95% confidence level (1.96), using the prevalence of work-related musculoskeletal disorders found to be 76% among dairy workers in a study done by Neeti Mishra et al.,[3] and a precision of 7%. Institutional Ethics Committee approval was obtained [26/2022]. We recruited those dairy farmers registered at the milk co-operative society and those who fulfilled the inclusion criteria. After explaining the purpose of the study and reading out the subject information sheet, written informed consent was obtained from all participants. Permission to publish the data and the photographs related to this study was obtained from the participants.

The information was collected using a structured interview schedule which consisted of the following parts: Socio-demographic details, Occupation details, Ergonomics questions, Co-morbidities, assessment of mental health by Patient Health Questionnaire-9 (PHQ-9),[5] and assessment of musculoskeletal disorders by Standardized Nordic Questionnaire (SNQ),[6] which captured data about pain in the last 12 months or the last 7 days and that if the study participants had consulted a physician for the same. We also observed the farmers during their working hours, to understand the probable postures leading to musculoskeletal disorders.

Data was collected using Epicollect5, entered in Microsoft Excel 2019, and analyzed using SPSS v21.0 (Statistical Package for the Social Sciences analytic software version 21.0). Univariate analysis was done on baseline characteristics such as age, gender, socio-economic status, musculoskeletal issues, mental health status and occupational factors. In Bivariate analysis, factors that were significantly associated with mental health status and musculoskeletal disorders were identified. In the regression model, we added sociodemographic variables, occupational factors, and history of chronic illness as independent variables for the outcome of musculoskeletal disorders.

Results

Sociodemographic details:

A total of 150 dairy farmers were interviewed in our study. The mean age of our study participants was 40.96 ± 13.49 years. The years of formal education were 7.57 ± 3.4 years. About 99 (66%) males and 51 (34%) females made up our study population. According to Modified BG Prasad classification 2021,[7] less than half of most of the dairy farmers 58(38.7%) belonged to middle socio-economic status. Among our study participants, 23(15.4%) had access to health insurance and 13(8.7%) were availing social security schemes.

Occupation details:

Working hours per day were more than 8 hours for 29(19.3%) dairy farmers. Prolonged standing for more than 4 hours in a day was seen in 84(56%). Milking in a squatting position for more than half an hour was found to be among 99(66%) [Figure-1] and lifting of heavy weights was seen in 117(78%) [Figures 2 and 3].

Figure-1

Figure-2

Figure-3

Figures 1-3: Common ergonomic hazards prevalent among the dairy farmers

Comorbidities related details:

We found that 37 (24.7%) and 30 (20%) of the dairy farmers were known cases of diabetes mellitus and hypertension respectively. Among the dairy farmers, it was found that 8(5.3%) had mild depression and 142(94.7%) had no or minimal depression.

WRMSDs among dairy farmers:

WRMSDs were found to be present among 97 (64.7%) dairy farmers in the last 12 months according to SNQ. The assessment of pain in various sites of the body in the last 12 months, last 7 days and if consulted a physician for the pain has been depicted in Table 1. The most common sites of pain in the last 12 months were lower back-73 (48.7%) and knees-68(45.3%) and in the last 7 days most common sites of pain were lower back 42 (28.0%) and knees 35 (23.3%).

Determinants of the WRMSDs:

On bivariate analysis, it was found that dairy farmers aged>40 years had higher WRMSDs compared to those aged ≤40 years, which was statistically significant ($p<0.05$). The prevalence of WRMSDs was higher among female dairy farmers compared to male dairy farmers, which was statistically significant ($p<0.05$). Dairy farmers who belonged to class III of socio-economic status were found to have the highest prevalence of WRMSDs compared to dairy farmers belonging to other socio-economic statuses ($p<0.05$). [Table-2]

Table-1: Assessment of Musculoskeletal Disorders by Standardized Nordic Questionnaire.

Sites	Pain in last the 12 months	Pain in last the 7 days	Consulted a physician for pain
Neck	35(23.3%)	30(20.0%)	7(4.7%)
Shoulders	40(26.7%)	30(20.0%)	5(3.3%)
Upper back	35(23.3%)	26(17.3%)	4(2.7%)
Elbows	13(8.7%)	8(5.3%)	1(0.7%)
Wrists/hands	33(22%)	23(15.3%)	4(2.7%)
Lower back	73(48.7%)	42(28.0%)	22(14.7%)
Hips/thighs	28(18.7%)	19(12.7%)	5(3.3%)
Knees	68(45.3%)	35(23.3%)	23(15.3%)
Ankles/feet	26(17.3%)	12(8.0%)	9(6.0%)

Table-2: Association of socio-demographic factors with Musculoskeletal disorders.

Variable	Category	Total	Musculoskeletal disorder		p-value
			Present	Absent	
Age	≤40 years	81(54.0%)	42(51.9%)	39(48.1%)	<0.001
	>40 years	69(46.0%)	55(79.7%)	14(20.3%)	
Gender	Male	99(66%)	57(57.6%)	42(42.4%)	0.011
	Female	51(34%)	40(78.4%)	11(21.6%)	
Religion	Hindu	136(90.6%)	88(64.7%)	48(35.3%)	0.850
	Christian	7(4.7%)	4(57.1%)	3(42.9%)	
	Muslim	7(4.7%)	5(71.4%)	2(28.6%)	
Socioeconomic status	Class I	0(0%)	0(0%)	0(0%)	0.017
	Class II	39(26.0%)	26(66.7%)	13(33.3%)	
	Class III	58(38.7%)	38(65.5%)	20(34.5%)	
	Class IV	35(23.3%)	27(77.1%)	8(22.9%)	
	Class V	18(12.0%)	6(33.3%)	12(66.7%)	

On further analysis of work-related factors, it was found that WRMSDs were highly prevalent among dairy farmers with a history of prolonged standing, which was statistically significant ($p<0.001$). WRMSDs were present among dairy farmers who milked >10 liters in a day and it was

also statistically significant (p<0.05) [Table-3].

It was found that WRMSDs were present among dairy farmers who had comorbidities like diabetes mellitus, hypertension, cardiovascular diseases, and mild depression and it was statistically significant (p<0.05) [Table4]

Table 3: Association of work-related factors with Musculoskeletal disorders.

Variable	Category	Total	Musculoskeletal disorder		p-value
			Present	Absent	
Prolonged standing	Yes	84(56%)	64(76.2%)	20(23.8%)	0.001
	No	66(44%)	33(50%)	33(50%)	
Lifting heavy weight	Yes	117(78%)	72(61.5%)	45(38.5%)	0.131
	No	33(22%)	25(75.8%)	8(24.2%)	
Prolonged sitting in squatting position	Yes	99(66%)	60(60.6%)	39(39.4%)	0.147
	No	51(34%)	37(72.5%)	14(27.5%)	
Any other awkward position	Yes	9(6%)	8(88.9%)	1(11.1%)	0.117
	No	141(94%)	89(63.1%)	52(36.9%)	
Litres milked in a day	≤10 litres	134(89.3%)	82(61.2%)	52(38.8%)	0.010
	>10 litres	16(10.7%)	15(93.8%)	1(6.2%)	

Table 4: Association of comorbidities with Musculoskeletal disorders.

Variable	Category	Total	Musculoskeletal disorder		p-value
			Present	Absent	
Diabetes mellitus	Yes	37(24.7%)	32(86.5%)	5(13.5%)	<0.001
	No	113(75.3%)	65(57.5%)	48(42.5%)	
Hypertension	Yes	30(20%)	28(93.3%)	2(6.7%)	<0.001
	No	120(80%)	69(57.5%)	51(42.5%)	
Tuberculosis	Yes	5(3.3%)	5(100%)	0(0%)	0.162
	No	145(96.7%)	92(63.4%)	53(36.6%)	
Bronchial asthma	Yes	7(4.7%)	4(57.1%)	3(42.9%)	0.670
	No	143(95.3%)	93(65.0%)	50(35.0%)	
Cardiovascular disease	Yes	8(5.3%)	8(100%)	0(0%)	0.032
	No	142(94.7%)	89(62.7%)	53(37.3%)	
Depression	Yes	8(5.3%)	8(100%)	0(0%)	0.032
	No	142(94.7%)	89(62.7%)	53(37.3%)	

Multivariate analysis was done by logistic regression with all the factors that were statistically significant on bivariate analysis and it was found that belonging to the male gender [aOR=0.33(95%CI:0.12-0.85)] and prolonged standing [aOR=3.39(95%CI:1.46-7.89)] were the risk factors [Table 5].

Table 5: Association of various factors with Musculoskeletal disorders: Multivariate logistic regression

Variable	Category	Total	AOR (95%)	p-value
Age	≤40 years	81(54.0%)	1.91(0.71-5.17)	0.198
	>40 years	69(46.0%)	1	
Gender	Male	99(66%)	0.33(0.12-0.85)	0.023
	Female	51(34%)	1	
Prolonged standing	Yes	84(56%)	3.39(1.46-7.89)	0.004
	No	66(44%)	1	
Lifting heavy weight	Yes	117(78%)	0.99(0.24-4.09)	0.997
	No	33(22%)	1	
Prolonged sitting in a squatting position	Yes	99(66%)	0.62(0.20-1.97)	0.427
	No	51(34%)	1	
Liters milked in a day	≤10 liters	134(89.3%)	1	0.082
	>10 liters	16(10.7%)	7.38(0.77-70.30)	
Diabetes mellitus	Yes	37(24.7%)	2.75(0.68-11.08)	0.153
	No	113(75.3%)	1	
Hypertension	Yes	30(20%)	3.05(0.50-18.46)	0.223
	No	120(80%)	1	

Discussion

This study aimed to assess the prevalence of WRMSD in dairy farmers and it was found to be present among 97 (64.7%) of the study participants which is lower when compared to a study done by Neeti Mishra et al. among 50 dairy workers in Surat, Gujarat in the year 2020 where the prevalence of musculoskeletal disorder was seen among 38 (76%) of the participants.[3] In a study done by Bhavani Gadhavi et al.in the year 2019 among 947 farmers in Ahmedabad, Gujarat, the prevalence of musculoskeletal disorders was found to be present in 80% of the participants.[8] There are several studies done on people with different occupations like farmers, goldsmiths, handicraft workers and sanitary workers to assess the prevalence of WRMSDs and it is high.[8-11] Even though there are advanced technologies in dairy farming like machines for automatic milking systems, automatic feeding and manure scrapers in both developed and developing countries, MSDs are still found to be high among dairy farmers.[1] The nature of the dairy farming occupation itself ensures that complete mechanization is not possible and hence involves extensive manual tasks that cause non-ergonomic working conditions.[12] In India, most dairy farmers belong to the unorganized sector and musculoskeletal disorder is significantly high in this population due to the nature of occupations which involve constrained positions of the body, repetitive movements, force focused on certain parts of the body and the type of work does not permit adequate recovery between the work movements.[13] One feasible intervention in this population is the importance of reinforcing mandatory rest periods between busy working hours such as early mornings. Short breaks can be taken by the farmers to relax the muscles during work hours. They can also be taught how to

control muscle tension.[14]

This study assessed for pain in nine sites of the body, according to the Standardized Nordic Questionnaire and pain was found to be present in all sites. Pain was found to be highest in the lower back-73 (48.7%) and in the knees – 68 (45.3%). A study done by Neeti Mishra et al. found that the most common sites of MSDs were lower back -32%, knee -18%, upper back -8%, and shoulder -2%.[3]

Lower back contributes to most of the burden caused by Musculoskeletal disorders, globally and the adoption of the World Health Organization's "Rehabilitation 2030 initiative" by the Government of India should address gaps in tertiary prevention of musculoskeletal disorders among underprivileged populations.[15] Studies on dairy farmers and workers conducted at the national and international levels have likewise revealed comparable high frequencies of WRMSD and the main sites being lower back and knees.[1,3,8] This could be related to the sitting posture during milking, and lifting of heavy weights like milk cans, manure and fodder.

In this study, on bivariate analysis, it was found that factors such as dairy farmers aged > 40 years, female gender, standing for long hours, milked > 10 liters in a day, dairy farmers with co-morbidities like diabetes mellitus, hypertension, cardiovascular disease and depression were statistically significant ($p<0.05$). On logistic regression, the factors found to be associated with WRMSDs were gender and standing for long hours in a day ($p<0.05$). Dairy farming, like another unorganized sector, is usually chosen by less educated, elderly and lower socioeconomic status groups in villages. This further enhances the exposure of this population to ergonomic hazards.[16]

The dairy farmers who were found to have mild depression during the interview were referred to the hospital where the investigators were working and followed up. The dairy farmers who complained of acute pain were also referred for further evaluation and treatment.

Conclusions

The prevalence of WRMSDs is found to be high among dairy farmers and the main sites of pain were seen in the lower back and knees. Hence, we would like to recommend ergonomic work postures, regular breaks and rest at adequate intervals during work hours. Health education must be provided on ergonomics, and routine physical activity through the involvement of local dairy cooperative society. Accessibility to social security schemes will improve the health status of this group of individuals.

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