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Work related musculoskeletal disorders among the women workers in ginning mills of Dharwad Taluka

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Abstract
Musculoskeletal disorders (MSDs) are the most common work-related health problem, with almost one in four workers reporting backache and one in five complaining of muscular pains. Manual handling, lifting, holding, putting down, pushing, pulling, carrying or movement of a load is the largest cause of injury in the textiles sector. Hence, a study with the aim of assessing prevalence of Work related musculoskeletal disorders among women workers in ginning mills of Dharwad taluka. The study was carried out in three ginning mills located in and around Dharawad taluka, Karnataka. It was revealed that about highest mean score is for legs *i.e.*, 3.41 which depicts moderate pain in lower back and age of the workers was found to be significantly associated with pain in neck and lower back.

Keywords: Ginning mill, musculoskeletal disorder, workers, health problems, occupation

Introduction
Musculoskeletal disorders (MSDs) are a common health problem throughout the world and a major cause of disability. The economic loss due to such disorders affects not only the individual but also the organization and society as a whole. At the present time, MSDs is one of the most important problem ergonomists are encountering in the workplace all over the world. Cotton ginning is one of the most tedious work, requiring long hours of static and heavy work and can be a high-risk occupation for developing MSDs as awkward posture, repetitive movements and contact stress are common.

In India, 20 million workers are involved in the manufacturing of textiles. Worldwide, India is the second largest producer of textile goods, which account for 20% of the national industrial output. Twenty million workers are employed in 1175 cotton mills across the country, representing a major occupational group Industrialization is necessary for prosperity and at times for the survival of a Nation (Sandeep *et al*., 2016) [6].

The production is the real wealth of a Nation. Only industrialization is not enough, real benefit is brought by continuous top performance of the worker which is only possible by their good health. Industrial workers constitute only a segment of general population and the factors that influence the health of the population also apply equally to industrial workers i.e. water supply, sewage and waste disposal, nutrition and education, and the conditions prevailing in their place of work. Occupational environment is the sum of external condition and influences which prevail at the place of work and which have a bearing on the health of the working population.

The industrial workers today are placed in a highly complicated environment which is getting more complicated as man is becoming more ingenious. The textiles sector contains many hazards and risks to workers, ranging from exposure to noise and dangerous substances, to manual handling and working with cotton dust. Some of these are particularly dangerous for women's health Musculoskeletal disorders (MSDs) are the most common work-related health problem, with almost one in four workers reporting backache and one in five complaining of muscular pains. Manual handling, lifting, holding, putting down, pushing, pulling, carrying or movement of a load, is the largest cause of injury in the textiles sector. This paper highlights the Musculoskeletal disorders (MSDs) prevalent in ginning mills.

Material and methods
The present study was undertaken in three ginning mills of Dharwad taluka, Karnataka during the year 2016-17. From each ginning mill 30 women workers were randomly selected for the study. A self-structured pre tested interview schedule was administered on 90 ginning mill

Women workers. Personal interview technique was used to gather the general and specific information, Bishop Body map was used to collect the data on musculoskeletal disorder. The data was further tabulated and analysed by calculating frequency, percentage, chi square test.

Results and discussion

Irrespective of the ginning mills, 44.4 per cent of the workers belonged to the age group of 38-49 years followed by less than 37 years (30%) and more than 49 years (24.4%) of age group. Chaudhry *et al.* (2015) [1] and Sebsibe *et al.* (2016) [8] were found in their study that majority of the workers were belonged to middle age group.

With regard to the education, 44.44 per cent of the workers were illiterate followed by education up to primary but attended school for at least one to two years (28.8%) and primary education but less than 10thclass (14.4%). These findings are on par with the results of Thoreia *et al*. (2005) [10] which revealed majority of the women (18.5%) were illiterate.

With regard to the type of family, Irrespective of ginning mills, it is clear from the table that, 70 per cent of the workers belonged to the nuclear family type, followed by joint family (30%). Vastrad *et al*. (2013) [11] also found in their studies that majority of the workers (90%) belonged to nuclear family.

Over all findings showed that higher percentage of workers *i.e.*, 47.77 per cent belonged to small family size followed by medium family (44.4%) and large family (6.4%). Indumathy and Kamalraj (2012) [3] revealed the similar findings that majority of the workers (36.66%) belonged to medium size family.

With regards to the caste, it is clear from the table that, 47.77 per cent of the women belonged to the upper caste, which was followed by OBC (44.44%), dalits (4.4%) and tribals (33.33%). The findings of the study are in line with the results of Samata (2009) [7].

Highest percentage (43.33%) of the women workers had their annual family income more than Rs 1, 20,000, followed by Rs 60,000 to 1, 20,000 (28.88%) and Rs 60,000 (27.7%). The findings are in line with the results of Sekar *et al*. (2012) [9].

Table 2 depicts the body postures used by the women workers while performing different activity in ginning mills. In all the three selected ginning mills most of the women workers (43.33%, 46.66%, and 46.66% respectively) were frequently used sitting posture for preliminary cleaning activity followed by picking of cotton from bags (30%, 43.33% and 40% respectively) same posture was used. During loading of cotton to the machine equal per cent of the workers (40%, 66.66%, and 70% respectively) used both standing as well as bending postures. For pressing and packing of cotton bundles (60%, 40% and 30% respectively) same posture was used. On the other hand most of the workers (43.33% 33.33% and 16.66% respectively) used sitting, standing as well as squatting posture while doing shedding of lint with gunny bags. The findings of the study are in consistent with results of Deepa, and Manjusha (2012) [2].

Table 3 presents mean score of musculoskeletal disorders. In first ginning mill over all mean scores of pain obtained for the body, highest mean score is for legs *i.e.*, 3.06 which depicts moderate pain in legs. Followed by lower back with mean score of 3.03, shoulder with mean score 2.9, upper arm with mean score 2.83, thigh with mean score 2.56 which depicts mild pain, neck with mean score 2.40, finger with mean score 2.33, palm with mean score 2.20, mid back with mean score 2.0 and buttocks with mean score 1.06 which depicts very mild pain.

In second ginning mill, highest mean score is for lower back *i.e.*, 3.96 which depicts severe pain in lower back, followed by shoulder with mean score of 3.06 which depicts moderate pain in shoulder, upper arm with mean score 2.93, legs with mean score 2.83, thigh with mean score of 2.26 which depicts mild pain in thigh and palm with mean score of 0.5 which depicts very mild pain in palm.

In third ginning mill, workers perceived severe pain in ankle with mean score of 3.96 followed by palm with mean score of 3.20, mid back with mean score of 3.11, shoulder with mean score 2.86 which depicts moderate pain in shoulder, upper back 2.71, lower back with mean score 2.43 which indicates mild pain in lower back, thigh with mean score 2.3, upper arm with mean score 2.23 and buttocks with mean score of 1.46 which depicts very mild pain in buttocks.

Further irrespective of ginning mills highest mean score is for lower back *i.e.*, 3.41 which depicts moderate pain in lower back followed by leg with mean score 2.93, shoulder with mean score 2.88, mid back with mean score 2.61 and buttocks having mild pain with mean score of 1.66. The musculo-skeletal complaints are prominent in the study because the women workers were in a long sitting posture without any backrest and maintained this position for at least 8 hours a day. Kalpana Devi and Kiran (2015) [5].

Table 4 interprets association between age of the workers and musculoskeletal disorders. In first ginning mill age of the workers was found to be significantly associated with pain in neck and lower back. Age was found to be non-significant with pain in any of the body parts in second ginning mill. Whereas, in third ginning mill, age was found to be significantly associated with pain in ankle.

Table 5 indicated that work experience of workers was found to be significantly associated with upper arm and lower back pain. In second ginning mill work experience of workers was found to be significantly associated with pain in shoulder and buttocks. In third ginning mill also experience of the workers was found to be significantly associated with pain in foot while pain in other body parts namely neck, shoulder, and upper back, mid back, lower back, buttocks, palm, finger, thigh, leg and ankle were found to be non-significant.

Table 1: Socio economic characteristics of ginning mill workers N=90

	Characteristics	Frequency	Percentage
Age	<37 years	27	30.00
	38 – 49 years	40	44.44
	>49	23	24.44
Education	Illiterate	41	44.44
	Just literate but no schooling	7	7.77
	primary but attended school for at least one to two year	26	28.88
	Primary but <10th	13	14.44
	10thClass pass but < graduation	3	3.33

Type of family	Nuclear	63	70.00
	Joint	27	30.00
Family size	Small (<4)	43	47.77
	Medium (4-8)	41	44.44
	Large (>8)	6	6.44
Caste	Tribal	3	3.33
	Dalits	4	4.44
	OBC	40	44.44
	Upper cast	43	47.77
Total family annual income (Rs)	< 60000	24	27.77
	60000-1,20,000	26	28.88
	>1,20,000	39	43.33

Table 2: Body postures used by women workers while performing different activity in ginning mill N = 90

Type of Activities	Ginning mills											
	GI (n1=30)				GII (n2=30)				GIII (n3=30)			
	Body posture used											
	Sitting	Standing	Bending	Squatting	Sitting	Standing	Bending	Squatting	Sitting	Standing	Bending	squatting
Preliminary cleaning	13 (43.33)	-	-	-	14 (46.66)	-	-	-	17 (56.66)	-	-	-
Loading cotton in machine	-	15 (50.00)	15 (50.00)	-	-	20 (66.66)	20 (66.6)	-	-	21 (70.00)	21 (70.00)	-
Collecting cotton from machine	-	6 (20.00)	6 (20.00)	-	-	7 (23.33)	7 (23.33)	-		8 (26.66)	8 (26.66)	-
Picking cotton from bags	9 (30.00)	-	-	-	13 (43.33)		-	-	15 (50.00)	-	-	-
Pressing and packing cotton bundles	-	18 (60.00)	18 (60)	-	-	12 (40.00)	12 (40.00)	-	-	9 (30)	9 (30.00)	
Shedding of lint with gunny bag	-	16 (53.33)	16 (53.33)	16 (53.33)	-	10 (33.33)	10 (33.3)	10 (33.33)		5 (16.66)	5 (16.66)	5 (16.66)

(Note: Figures in parentheses indicate percentage multiple responses are obtained)

Table 3: Mean score of musculoskeletal disorders perceived by women workers in ginning mills

Body part	Ginning mill I (n1=30)						Ginning mill II (n2=30)						Ginning mill III (n3=30)						Total (n=90)
	1	2	3	4	5	M.S	1	2	3	4	5	M.S	1	2	3	4	5	M.S	Mean score
Neck	-	3 (10.00)	4 (13.33)	9 (30.00)	4 (13.33)	2.4	1 (3.33)	2 (6.66)	8 (26.66)	8 (26.66)	1 (3.33)	2.06	-	9 (30.00)	12 (40.00)	4 (13.33)	-	2.4	2.22
Shoulder	-	9 (30.00)	12 (40.00)	7 (23.33)	1 (23.33)	2.9	-	8 (26.66)	9 (30.00)	10 (33.33)	3 (10)	3.06	-	8 (26.66)	11 (36.66)	7 (23.33)	-	2.86	2.88
Upper back	6 (20.00)	15 (50.00)	5 (16.66)	3 (10.00)	-	2.16	1 (3.33)	13 (43.33)	8 (26.66)	8 (26.66)	-	2.3	-	6 (20.00)	14 (46.66)	6 (20.00)	1 (3.33)	2.71	2.34
Upper arm	9 (30.00)	14 (45.55)	5 (16.66)	1 (3.33)	-	2.83	2 (6.66)	7 (23.33)	9 (30.00)	9 (30.00)	2 (6.66)	2.93	1 (3.33)	16 (53.33)	6 (20.00)	3 (10)	-	2.23	1.90
Mid back	7 (23.33)	13 (43.33)	9 (30.00)	-		2	1 (3.33)	15 (50.00)	12 (40.00)	1 (3.33)	1 (3.33)	2.4	3 (10)	18 (60.00)	7 (23.33)	1 (3.33)		3.11	2.61
Lower back	-	2 (6.66)	13 (43.33)	7 (23.33)	4 (13.33)	3.03	2 (6.66)	7 (23.33)	9 (30.00)	12 (40.00)	-	3.96	-	2 (6.66)	11 (36.66)	8 (26.66)	5 (16.66)	2.43	3.41
Buttocks	-	8 (26.66)	9 (30.00)	2 (6.66)	-	1.06	1 (3.3)	19 (63.33)	2 (6.66)	-	-	1.5	-	4 (13.33)	12 (40.00)	4 (13.33)	-	1.46	1.66
Palm	3 (10.00)	14 (46.66)	9 (30.00)	9 (30.00)	2 (6.66)	2.2	3 (10.00)	6 (20.00)	-	-	-	0.5	-	-	20 (66.66)	7 (23.33)	1 (3.33)	3.2	2.24
Finger	-	2 (6.66)	14 (46.66)	12 (40.00)	1 (3.33)	2.33	-	15 (50.0)	9 (30.00)	-	-	1.9		4 (13.33)	9 (30.00)	5 (16.66)	5 (16.66)	1.83	1.88
Thigh	-	8 (26.66)	11 (36.66)	7 (23.33)	-	2.56	-	2 (6.66)	9 (30.00)	16 (53.33)	-	2.26		1 (3.33)	3 (10.00)	11 (36.66)	4 (13.33)	2.3	2.44
Leg	1 (3.33)	3 (10.00)	11 (36.66)	4 (13.33)	-	3.06		-	2 (6.66)	9 (30.00)	16 (53.33)	2.83		-	8 (26.66)	11 (36.66)	7 (23.33)	2.56	2.93
Ankle	-	6 (20.00)	13 (43.33)	9 (30.00)	1 (3.33)	0.96		-	8 (26.66)	16 (53.33)	4 (13.33)	2.13		-	11 (36.66)	12 (40.00)	4 (13.33)	3.96	1.75
Foot	-	2 (6.66)	4 (13.33)	5 (16.66)	1 (3.33)	0.56		3 (10.00)	10 (33.33)	11 (36.66)	2 (6.66)	2.23		7 (23.33)	5 (16.66)	8 (26.66)	4 (13.33)	2.43	1.74

(Note; 1.Very mild 2. Mild 3. Moderate 4. Severe 5. Very severe, M. S – Mean Score
Figures in parentheses indicate percentage and multiple responses are obtained

Table 4: Association between age of the respondents and musculoskeletal disorders

Body part	Ginning mill I (n1=30)	Ginning mill II (n2=30)	Ginning mill III (n3=30)
	X^2 value	X^2 value	X^2 value
Neck	17.296*	5.260	6.624
Shoulder	2.975	6.036	5.915
Upper back	8.767	9.721	10.204
Upper arm	4.381	7.719	4.555
Mid back	3.582	6.835	7.788

Lower back	16.559*	4.820	1.692
Buttocks	5.000	1.451	6.087
Palm	10.582	2.776	6.903
Finger	7.937	12.470	3.455
Thigh	9.164	4.089	3.376
Leg	7.504	7.000	3.455
Ankle	8.50	7.000	11.093*
Foot	3.838	10.089	6.063

*significant at 5% level

Table 5: Association between work experience of the respondents and musculoskeletal disorders

Body part	Ginning mill I (n1=30)	Ginning mill II (n2=30)	Ginning mill III (n3=30)
	X^2 value	X^2 value	X^2 value
Neck	12.118	8.457	4.509
Shoulder	14.573	**20.800***	9.226
Upper back	8.410	6.663	6.063
Upper arm	17.523*	13.069	4.931
Mid back	4.190	5.734	8.814
Lower back	22.715*	11.851	18.195*
Buttocks	15.998	34.379**	2.295
Palm	11.264	8.067	1.645
Finger	13.155	2.874	11.215
Thigh	2.695	7.190	11.215
Leg	19.694	12.321	5.556
Ankle	8.871	14.879	10.796
Foot	4.984	13.791	22.143*

*significant at 5% level
**significant at 0.01 level

Conclusion

It could be concluded that musculoskeletal disorders are widely prevalent among ginning mill workers. Workers in the ginning mill, performs task in a sitting position, standing position, static and awkward postures. There are numerous risk factors that can affect workers health, comfort and performance in one or more ways and duration of work, furniture design, and adequate rest pause are most often associated with the occurrence of serious musculoskeletal disorders. Age and experience of worker is found to be significantly associated with musculoskeletal disorders. So, more emphasis is needed to train the workers before they start their work to reduce MSDs in order to have a healthy workforce and healthy workforce ultimately contributing to high productivity and gains.

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