



## Research Article

### MUSCULOSKELETAL DISORDERS AND VISUAL STRAIN AMONG HANDLOOM WEAVERS

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#### ABSTRACT

The study was conducted to estimate prevalence of musculoskeletal pain/discomfort and visual strain symptoms among weavers and explore association with work factors. The sample consisted of 175 weavers and 129 control group in the same location. Eighty six per cent of weavers reported musculoskeletal discomfort in the previous year with the highest prevalence rate found for the neck (58%). The 12 month reported prevalence for visual strain symptoms was 47%, tired eyes (41%) was the most commonly reported symptom. In the last week, 56% reported pain/discomfort and 25% visual strain symptoms. Weavers reporting pain in the previous year were more likely to be dissatisfied with their jobs ( $p < 0.01$ ), to report a lack of choice in deciding what profession they want ( $P < 0.02$ ), to have insufficient time to match with market demand ( $P < 0.05$ ) or to get help from Government ( $P < 0.03$ ). The prevalence of self-reported musculoskeletal discomfort and visual strain symptoms was high among weavers. A systematic approach for risk reduction addressing psychosocial and physical work factors is required.

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## INTRODUCTION

Tradition of hand weaving is a part of Indian cultural heritage and symbolises ability of the weavers to design intricate artistic and attractive products by use of handlooms. The handloom sector of India is known all over the world for its uniqueness and intricate designs. It has established its reputation as a timeless facet of the rich cultural heritage of India. So far as the contribution of the sector to the Indian economy is concerned, it occupies a place next to the agriculture in providing livelihood for the mass. It is estimated that the handloom sector provides directly employment to 65 lakh of work force and millions indirectly. It not only plays a pivotal role in generating employment opportunities but also represents generational legacy exemplifies richness and diversity of the country and the artistry of weavers. The most of the handloom clusters belongs to rural areas and hence it plays a crucial role for eradicating poverty in rural India and bridging the gap between urban and rural along with facilitating gender equality as about 40 percent of the work force in this sector are women. Despite the fact that Indian handloom industry has made a distinct place in the world, this sector has not attained proper importance as far as weaving related health problems and their effects are concerned.

The Several health hazards are associated with weaving and related activities which may cause stress and strain to weavers and pose several health related risk factors to them. main health and safety hazard faced by weavers, included musculoskeletal disorders (MSDs) due to odd squatting position and vision disorders due to continuous attention required during work. Physical workplace factors like prolonged static muscle load, workstation factors have been identified as risk factors for musculoskeletal diseases (Feveile *et al.*, 2002; Trop *et al.*, 2001; Buckle and Devereux, 2002; National Institute of Occupational Safety and Health, 1997). Prolonged work in fixed or awkward positions (Yu and Wong, 1996; Toivonen and Takala, 1999; Straker and Mekhora, 2000), seated and static work and overuse (Carter and Banister, 1994) have been identified as MSD risk factors. Although relatively few studies have investigated visual strain, it has been linked to musculoskeletal complaints (Abib and Dutta, 1998) and work stress (Ong, 1993). Psychosocial and organisational factors were related to the experiences of psychosocial stress, musculoskeletal disorders and problems with vision among computer users (Seppala, 2001). Usually weaving communities have crowded, poorly ventilated and poorly lighted rooms. Workers have to work under unhygienic conditions leading to health problems. Moreover the working time in such poorly managed environment is 12 hours and work in shifts i.e., morning and evening. Sometimes, it takes 14-16 hours and they continuously have to sit on weaving machine without any rest.

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According to Occupational Health Study in Carpet weaving industry in Iran, the main health and safety hazard faced by weavers, included musculoskeletal problems due to odd squatting position and vision disorders due to continuous attention required during work. In the current scenario, the handloom weavers are the poorest of the lot, least respected, socially and economically deprived living in debts and almost living like an island in the Indian society. Besides in large parts of India, handloom weaving lost its fame and prosperity. Adult handloom weavers are one of its biggest assets. They are the pillars and foundations of weaving community. It is splendid to utter that an ancient tradition affords large employment opportunities. In view of the importance of weaving industry to the national economy it is essential to understand the health issues of this population.

Hence the present study was planned with the following objectives.

- To estimate the prevalence of musculoskeletal pain discomfort and visual strain symptoms among data processors at two sites and
- To explore the association with work factors (e.g. work pace and intensity) and satisfaction (e.g. social support received).

## MATERIALS AND METHODS

A participatory approach was undertaken; workers views were used in combination with expert assessments to meet the study aims, however only the questionnaire results comparing weavers and a control group are reported here. The work of the weavers was sedentary, visually intensive and required a high level of vigilance. The researchers made a preliminary visit to weaving community to observe the work environment and tasks performed to design the questionnaire. An anonymous retrospective epidemiological questionnaire comprised questions on age, gender, hours worked, annual 7 day prevalence of pain/discomforts and visual strain symptoms, and work organisation and work activities. The presence of musculoskeletal pain and discomfort was investigated using the Nordic Musculoskeletal Questionnaire (Kourinka *et al.*, 1987). Visual strain symptoms were considered to be impaired visual performance, headaches, tired, red and sore eyes. The same number (245) of weavers and controls were selected for the study. But only 175 weavers and 129 controls finally participated in the study. The data were analysed. Independent tests were conducted on the background variables to investigate differences between work groups. Pearson Chi-squares were calculated to identify differences between groups with respect to prevalence of self-reported health problems and associations between potential risk factors and reported health problems. In order to investigate the relationship between the work and the presence of musculoskeletal or visual strain symptoms, odds ratios (OR) and their 95% confidence intervals (95% CI) were calculated. ORs were used as estimates of the relative risks. Only significant ORs are presented.

## RESULTS

The weavers (82%) and control (75%) samples comprised a high proportion of male workers. The groups did not differ significantly with respect to age, hours worked per day or years in this type of work, however weavers worked significantly more hours per week than the controls (Table 1).

Seventy-one percent (n = 123) of weavers conducted some overtime manual work 11% (n = 14) of controls conducted some overtime work. Eighty-six per cent of weaves reported musculoskeletal pain and discomfort in the previous year and 56% reported these problems in the last week. Seventy-three per cent of controls reported musculoskeletal problems in the last year and 42% in the last week. Weavers were twice as likely to report pain/discomfort in the last year (OR = 2.3, 95% CI = 1.31 – 4.18) and somewhat more likely to report problems in the last 7 days (OR = 1.8, 95% CI = 1.16 – 2.8) than the controls. The main body areas of concern for weavers were the neck, lower and upper back, wrists/hands and shoulders. The main areas of concern for controls were the lower back, neck and ankles/feet. Weavers were significantly more likely to report neck, lower and upper back, wrists/hands, shoulders and left elbow pain /discomfort than controls, controls were more likely to report ankle/feet pain and discomfort (Table 2 and 3). The health outcomes for the two groups of workers did not differ; pain and discomfort had led to approximately 14 % of weavers and controls being absent from work in the last year and 30% seeking medical advice eighty-one per cent of weavers attributed their pain and discomfort to work, poor seating (49%), constant work (24%), sitting in the same position for hours (23%) and weavers and workstation set-up (12%) as possible causes. Sixty-seven per cent of controls attributed pain and discomfort to work, standing most of the day (20%), lifting and bending (19%), continual movement of wrists/ shoulders (18%) and poor seating (16%) as possible causes.

Forty-seven per cent of weavers reported at least one visual strain symptom in the last year; 9 % reported all four symptoms. Twenty three per cent of controls reported at least one visual strain symptom in the last year while 2% reported all four symptoms. Twenty five per cent of weavers and 9% of controls reported at least one visual strain symptom during the previous week. Weavers were three times more likely to report visual strain symptoms in the last year (OR=2.9, 95% CI=1.76-4.81) and in the last week. (OR = 3.5, 95% CI = 1.72 - 7.09) than controls weavers were significantly more likely to report each visual strain symptom than controls (Table 4 and 5). Forty-six per cent of weavers believed their symptoms were work related. Looking for a long time (26%), poor light quality (14%) and poor environmental conditions (11%) were reported as possible causes. Twenty-four per cent of controls believed these problems were work related, citing inadequate lighting (10%), concentration required (9%) and poor environmental conditions (8%) as possible causes. Over 1/3 of weavers reported being dissatisfied with their jobs and with support received from Government and other weavers. The weavers reported more job dissatisfaction than the control group but no differences were evident for social support (Table 6).

The majority of weaves reported that they had to work fast and intensively. Nearly half the take weaves reported that the control group reported significantly less dissatisfaction with most of these work organisational aspects than the data processors. (Table 7). In contrast to those without pain, weavers who reported pain in the last year were more likely to be dissatisfied with their jobs (P< 0.01), to report a lack of choice in deciding what work they want (P<0.02), to find they did not have enough time to do all works (P<0.05) and to state that help was not available from Government (P<0.03).

**Table 1. Age of the respondents and hours and years worked**

	Weavers (n=175)		Controls ( n = 129)		Significance
	Mean	SD	Mean	SD	
Age(years)	35.5	7.1	38.6	10.3	Ns
Hours per day	9.1	2.1	8.6	2.7	Ns
Hours per week	47.9	11.2	43.9	11.6	P<0.003
Years worked	6.5	3.6	10.6	6.6	ns

**Table 2. prevalence (%) of pain/discomfort reported by 175 weavers 129 controls in previous year**

	% Last year			% Last 7 days		
	Weavers	Controls	Significance	Weavers	Controls	Significance
Neck	58	33	--	27	12	***
Lower back	54	43	--	25	23	ns
Right wrist/hand	52	12	--	23	8	****
Left wrist/hand	49	16	--	22	6	****
Right shoulder	39	26	--	21	9	**
Left shoulder	34	16	--	19	5	****
Upper back	30	20	--	17	9	*
Knees	14	12	ns	4	6	ns
Ankles/feet	14	33	--	7	16	**
Left elbow	9	2	--	3	1	ns
Right elbow	7	5	ns	2	1	ns
Hips/thighs	7	12	ns	3	8	*

\*\*\*\*p<0.0001, \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, ns = not significant

**Table 3. The odds ratios (OR) with 95 % confidence intervals (95% CI) for pain discomfort in the different regions reported by weavers in the previous year/7 days in comparison with the control group**

	Last year pain, OR (95% CI)	Last 7 days OR (95% CI)
Neck	2.9(1.8-4.7)	2.8(1.5-5.3)
Lower back	1.6(1.0-2.5)	Ns
Right wrist/hand	7.7(4.2-13.9)	3.5(1.7-7.4)
Left wrist/hand	5.3(3.0-9.2)	4.2(1.9-9.3)
Right shoulder	1.9(1.2-3.0)	2.5(1.3-5.1)
Left shoulder	2.7(1.5-4.7)	4.9(2.0-11.2)
Upper back	Ns	2.2(1.1-4.6)
Left elbow	4.2(1.2-14.8)	Ns
Ankles/feet	0.3(0.2-0.6)	0.41(0.2-0.9)

**Table 4. Prevalence (%) of visual strain symptoms reported by 175 weavers and 129 controls in previous year**

	% Last year			% Last seven days		
	Weavers	Controls	Significance	Weavers	Controls	Significance
Tired eyes	41	21	****	26	12	*
Headaches	30	13	***	12	4	**
Impaired visual performance	27	11	***	15	2	****
Red or sore eyes	26	14	***	16	4	***
All symptoms	9	2		4	0	

\*\*\*\*p<0.0001, \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, ns = not significant

**Table 5. The odds ratios (OR) with 95% confidence intervals (95% CI) for visual symptom reported by weaves in the previous year/7 days in comparison with the control group**

Visual strain symptom	Last year pain OR (95% CI)	Last 7 days pain, OR (95% CI)
Tired eyes	2.6(1.6-4.4)	2.4 (1.3-4.6)
Headaches	2.8(1.5-5.1)	3.4 (1.2-9.3)
Impaired visual performance	3.0(1.6-5.8)	7.7 (2.3-25.9)
Red or sore eyes	2.5(1.4-4.7)	4.7 (1.8-12.6)

**Table 6. Percentage of workers who were dissatisfied or very dissatisfied with aspects of their job**

	Data processors	Controls	Significance
Dissatisfied with job	35	19	**
Dissatisfied with help support from Government	37	29	ns
Dissatisfied with help support from other weaves	21	18	ns

\*\*\*\*p<0.0001, \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, ns = not significant

Table 7. Percentage of workers who reported frequently experiencing work organisation problem

	Data processors	Controls	Significance
Never had a choice in deciding what they want	81	67	*
Could never decide about future	78	68	**
Never had a choice in how they did their work	69	48	**
Often required to work very intensively	65	46	**
Often required to work very fast	61	46	*
Never got help form Government	43	9	****
Never had enough encouragement to do all work	21	16	ns
Often difficulty to earn	15	14	ns

\*\*\*\*P<0.0001, \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, ns = not significant

The controls who reported pain in the last year were more likely to report a lack of choice in deciding what they want ( $P<0.02$ ) or how they did their work ( $P<0.001$ ), not being able to decide about future ( $P<0.007$ ), having to work fast ( $P<0.05$ ) and finding they did not have enough encouragement to do their work ( $P<0.006$ ), than controls who did not report pain. The controls who reported pain in the last week were more likely to report being dissatisfied with their jobs ( $P<0.04$ ), having to work intensively ( $P<0.03$ ) and often having difficulty reaching market targets ( $P<0.03$ ). There were no significant associations between those who reported eye problems in the previous year/week.

## DISCUSSION

A high prevalence of pain /discomfort was reported by weavers in this study. The most frequently reported area of concern was the neck. The prevalence of self-reported visual strain symptoms among weavers was similar to findings of a small number of other studies on computer users (Davies, 2001; Pickclt and Lee, 1991). The factors identified by weavers were mainly physical work factors (e.g. poor seating, although job design issues were reported (e.g. the requirement to sit in the same position for many hours to conduct the task). In addition, statistical analysis indicated that weavers reporting pain in the last year were more likely to report problems with respect to job dissatisfaction, lack of Government support, time pressures and low social support. These psychosocial and organisational factors were also found to be related to experiences of MSD and visual strain in other studied (Burdorf and Sorock, 1997; Van Eijdsden-Besseling, 2004). No associations were found with overall reports of visual strain symptoms and work factors in this study, however, analysis of individual symptoms (e.g. red eyes) revealed significant findings, but the sample numbers were too small to report. The study findings suggest that a systematic approach to risk reduction in the weavers work is required.

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