

**Occupational Health Assessment of Power-loom Industry Workers in Solapur City****Somnath Kolgiri¹, Dr. Rahul Hiremath²**

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Conflicts of Interest: Nil

Abstract

Introduction: The power-loom sector is one of the important but unorganized parts of the textile industry of India and mostly run by private firms and plays an important role in the country's economy, providing employment to a significant population in urban and peri-urban areas. The power loom workers hardly ever benefit from occupational health-and-safety provisions.

Objectives: The aim of this study was to understand the occupational health-and-safety aspects of power-loom industry workers from Solapur City, Maharashtra, India.

Methodology: A sample of 450 workers from the identified power looms industries were assessed at the general physique, muscle tone, lung condition, and eyesight using different techniques. The study proposed at developing a framework for understanding risks to workers, resulting from lack of health factors in companies.

Results: The outcome of this result showed that most of the workers have been exaggerated by respiratory problems, increase in muscle tone, eye problems and musculoskeletal problem. It has been also observed that job safety or regular work blows positively to the workers' long term body health. However, there is an immediate need to accept and apply measures in accordance with Indian Factories

Act (OHSAS 18001/ILO-OSH 2001) which includes directions and procedures in respect of industrial work, installations, environment and occupational health and safety guidelines

Keywords: Power loom, Occupational health and safety aspects, Policies, Solapur

Introduction

Power-loom sector is one of the important but unorganized parts of the textile industry in India and plays an important role in the country's economy, providing employment opportunities to 12 million people with projected revenue of around US\$ 115 billion by the year 2012 and it generates about 27% of foreign exchange for the country and is a repository of the cultural heritage of the nation. [1]. State of Maharashtra in India with an estimated investment in 2012 of United State Dollar (US\$) 224 million on various textile projects is the biggest contributor to India's textiles market (<http://midcindia.org>). The prominent textile clusters in the state are Kolhapur, Nasik, Solapur and Thane [2]. The present study focuses on textile clusters of Solapur city. There is evidence from some studies in India about health risks to industry workers. Suryakar *et al* [3] carried out a study to assess exposure effects of cotton dust on oxidant and antioxidant status, which may induce, related health hazards. Another article by Agnihotram [4] provided a

review of existing evidence from community based epidemiological studies and addressed the growing need for evidence-based occupational health research in India. Knutsson [5] focuses on major disease related to shift work such as sleep disorders and risk of accidents. The effects of shift work on physiological function through disruption of circadian rhythms are well described. Knutsson [5] also provides a model to summarize possible mechanisms of disease in shift workers. Metgud *et al* [6] conducted an observational cross-sectional study on a sample of 100 women workers with respect to their cardio-respiratory and musculoskeletal profile before, during and at the end of work; Sant *et al* [7] have studied the adverse effect of smoke/flue on lung functions of glass factory workers of Firozabad district. Mùezzino [8], Spiro and Stigliani [9] and Hendrickson *et al* [10] have reported the adverse health impacts of textile effluents. Ayesha Anjum *et al* [11] studied regarding the health concerns among workers in weaving industry due to exposure to toxic chemicals, occupational health problems of workers involved in hand made carpets were subjected as skeletal deformities, ergonomic, eyesight and several health problems. Serious crippling arthritis of the knee and permanent deformities of fingers were caused during squatting working. The impact on the health of the different exposures vary across different strata in the community, like age groups, social groups, gender, occupations, educations and other characteristics.

The power loom contains many hazards and risks to workers, series from revelation to noise and dangerous substances, manual handling, and working with dangerous machinery these are increased repetitious, seated for a long period of time, squatting position, Uncomfortable work environment causes pain in hands and legs, and repetitive strain injuries like wrist, neck, shoulder and knee.

Aims & Objectives

To develop a framework for understanding the risks of the occupational health-and-safety aspects power-loom industry.

Material and Methods

To develop a framework for understanding the occupational risks of power-loom industry, during the field survey semi-structured interviews of unit owners and workers in various power-loom clusters were conducted with the help of a checklist. The power-loom industry has involved various steps in the process such as raw materials used, the environmental scenario due to the usage of raw materials, review of existing CETP units (Centralized Effluent Treatment Plant recently established) and present health status of workers and their working conditions were analyzed. The study covered both small scale and medium scale units. At the first stage out of 49 power-loom units from the city, a total of 15 Power loom industries were selected by random sampling technique from all fifteen industries. This is approximately 31% of the entire population. A survey has been done during December 2015 to December 2016. In the second stage, workers were selected from these textile mills. For the selection purpose of respondents, a complete list of permanent workers between the ages of 21 to 60 which have the minimum 3 years work experience was proportionally selected from all the 15 Power loom industries. A sample of 540 workers (consented to be interviewed) from power-loom industries participated and they were assessed by various measurements. The monitoring equipment's and parameters for measuring occupational health status are detailed below:

Health and safety standards in the industry

Weight and Height: The body mass index (BMI) is a heuristic proxy for human body fat based on an

individual's weight and height. The BMI is dependent on patterns of food consumption, associated living and working conditions, the nature and duration of physical work [12].

Hand Grip Meter: The test measures the maximum isometric strength of the hand and forearm muscles. This test is often used as a general test of strength. Strength also depends upon various activities like daily food intake, working hours, and pattern of work [13].

Peak Flow Meter: A peak flow meter is a handy, cheap, handheld device used to measure how air flows from the lungs in one "fast blast" [14]. The peak flow measurement of 350 l/min is considered to be normal for adults, while 200 l/min indicates a condition of chronic bronchitis and, therefore, major lung damage.

Eye testing: The Snellen chart is used by eye care professionals and others to measure visual acuity. There are several lines of block letters printed on the chart. The first line consists of very large letters or symbols, and subsequent rows have increasing letters or symbols decreasing in size. If the smallest row can be read accurately, it indicates that the person has good eyesight [15].

Results

Health and Safety Indicators: In the industries that were surveyed, the team was able to interview and measure the selected health parameters of 540 workers. To aid comparison of the occupational health status, these workers were divided into two categories depending on the number of years of engagement in the current unit: 372 of them had been with the units for up to 5 years, while 168 had worked for more than 5 years. The following [Table 1] shows the no. of workers engaged in various processes in our sample.

Body Mass Index (BMI): The BMI of the workers [Table 2] indicates that those remaining in the same unit for

longer durations had better health. In other words, regular work benefits the workers, while also reflecting the sound health of the industrial workers. For the improvement of the body mass index, our findings suggest that regular work with job security over time and incomes that enable the workers to sustain them and their families.

Pulmonary Function Test (PFT) and Pulmonary Health: The measurement of the PFT gives rise to much concern [Table 3]. In other words, all the workers are being exposed to vapors, gases, fibers, and particles in a work atmosphere that is not conducive to pulmonary health.

(a) The precautions to be taken in such situations are to use pigments and cleaning agents that do not emit vapors known to be injurious; (b) install exhaust systems which ensure proper ventilation in the sheds and a regular supply of fresh air; (c) periodic medical checkups of all workers to identify the early signs of pulmonary distress; and (d) rotation of jobs so that exposed workers are able to reduce the duration and intensity of their exposure.

Hand Grip Meter (HGM) and Muscle Tone: The result of the [Table 4] shows poorer health for the workers in the HGM test. The results of the test indicated that there was a decline in muscle tone. The safety measures comprise (a) regular rest periods to avoid muscle fatigue; (b) better designs of grips for the blocks and screens; (c) design of suitable places and registration guides; and (d) table heights that enable pressure to be applied directly to the blocks. These measures would also improve productivity

Eye Strain and Eyesight: Apart from the effects of work on the body, the lungs, and muscle tone, the repetitive work and the continuous visual attention to detail also appears to have an upset on the eyes of the workers [Table 5].

Normal eyesight, Hypermetropia (long sightedness), and myopia (short-sightedness) could be estimated through

eye testing using the Snellen chart: In addition, a few of the workers also reported symptoms of watering, cataract, strains and swelling in the eyes in both categories. Our observations in the workplace suggest that there is a lack of uniform and adequate lighting in most of the sheds. Proper illumination and regular breaks from work will enable the eye muscles to avoid fatigue and redesign of the working tables to enable work to be done within the normal eye range would offer further relief to the workers as well as improve the quality of the work.

Muscular Pains and Body Pains: Additionally, many of the workers also reported muscular pains in the back, at the joints and the lower abdomen [Table 6]. Results revealed that there were some complaints of pain in the chest and the right arm and shoulder. These complaints are clearly related to the nature of work. Regular rest periods are recommended through this report.

Some findings of the study: This baseline study, tried to examine the implicit linkages between working in the power-loom industry and its impact on the health of the workers. This analysis is based on a cross sectional study and requires more detailed observation of a larger sample with experimentation at specific pilot locations.

Some key findings from the pilot study are:

It was observed that the general body health improved for the workers in all sampled Power loom industries as they worked for more years, indicating that regular work is beneficial for workers in the long run.

- All the workers who participated in the survey were exposed to significantly higher levels of air pollution as only one-tenth seems to have normal lung functions. About 60% workers have reported Asthmatic tendency, whereas, 25% workers have shown symptoms of Chronic Bronchitis. It was noticed that the incidence of chronic distress increases with the number of years worked.

- In the surveyed textile industries, among the weavers, it was observed that the muscle tone of those workers engaged in repetitive laborious work declines with increasing number of working years.

- The eyesight of most workers is deteriorating over time in all locations, and a comparison between the workers shows that it is declining more rapidly for those engaged in certain tasks requiring immense and constant attention to detail.

- Interviews with workers give in a range of complaints regarding body aches, sores, cuts, burns and calluses, lung and eye problems, deafness, fatigue and sleeplessness, and stomach problems, in relation to 73% of workers have complained of muscle and body pain.

- However, some of the problems are made worse by workers' habits of smoking, chewing tobacco, drinking alcohol, and taking intoxicating materials.

Discussion

The study covered the sample survey of 540 power-loom workers in selected industries in Solapur city and the results showed that most of the workers have been impacted by the unhealthy and non-safety working conditions which resulted in 85 % workers affected by respiratory problems, 70 % have reported increase in muscle tone, 48% complained of eye problems and 73 % have been found affected by musculoskeletal problem. Hence, there is an immediate need to reinforce their workplace safety and health policies and implement measures in accordance with Indian Factories Act (OHSAS 18001/ILO-OSH 2001) which includes directions and procedures in respect of industrial installations, work environments such as dust, noise, temperature, and humidity. Based on these outcomes, it is strongly emphasizing the need for policies for successful implementation of health safety program. This will address key factors like the well-being of workers, the

development of policy and objectives related to hazard identification, emergency standards, and workers' participation in safety management, risk assessment, and risk control. Such initiative will ensure the commitment of the top management towards healthy and safe working practices. The above guidelines are needed for the major work-related risk factors that should be eliminated or minimized such as manual handling of materials, repetitive work, static work, segmental vibration, and poor psychosocial work environments. Studies and evaluations on the technological and economic feasibilities of the application of these guidelines need to be conducted.

Conclusion

From this study it is observed that, the possible solution for mitigating the problem would be regular work with regular wages to the workers, use of non-toxic materials and processes, improved ventilation and lighting, regular medical checkups, adequate rest periods, and job rotation.

Recommendation

Through this research work it is primarily hoped to enrich the lives of the power-loom workers and people in the district. It is also envisaged that the success of these pilots will effectively demonstrate the viability of health and safety issues. Finally, it is expected that the success of these projects will lead to scaling up of such initiatives to the state and national level under both commercial and CSR agendas. The results acquired can be disseminated through information and technology transfer to the nearby rural areas by setting up Innovation Centers and Centers of Excellence at the institution level. Funding and policy support is necessary for the success of such projects which can play a key role in improving the quality of life of the textile workers in the coming decades and contribute to sustainable and equitable development at a state and national level.

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Tables

Table 1 Process and Number of Workers

Textile Processes	Number of Workers												Total
	Male						Female						
	Age		Age		Age		Age		Age		Age		
	A	B	A	B	A	B	A	B	A	B	A	B	
Thread	4	8	4	8	4	8	3	5	3	5	3	5	60
Spinning	5	12	5	12	5	12	4	7	4	7	4	7	84
Weaving	5	13	5	13	5	13	5	7	5	7	5	7	90
Knitting	6	13	6	13	6	13	5	8	5	8	5	8	96
Bleaching	4	10	4	10	4	10	4	6	4	6	4	6	72
Dyeing	3	8	3	8	3	8	3	4	3	4	3	4	54
Printing	3	6	3	6	3	6	3	4	3	4	3	4	48
Finishing	2	5	2	5	2	5	2	3	2	3	2	3	36
Total	32	75	32	75	32	75	29	44	29	44	29	44	540

Table 2 Body Mass Index of Workers

Category of workers	Years worked in present	Number of workers	Body Mass Index (BMI)		
			Under	Normal	Over Weight
			Thread	0-5	42
	>5	18	3	15	0
Spinning	0-5	54	21	32	1
	>5	30	6	24	0
Weaving	0-5	66	24	42	0
	>5	24	3	20	1
Knitting	0-5	72	15	54	3
	>5	18	00	18	0
Bleaching	0-5	54	03	51	0
	>5	24	04	18	0
Dyeing	0-5	48	06	42	0
	>5	06	00	06	0
Printing	0-5	48	06	42	0
	>5	00	00	00	0
Finishing	0-5	36	09	27	0
	>5	00	00	00	0

Table 3 Pulmonary Function Test

Category of workers	Years worked in	Number of workers	Pulmonary Function Test		
			Norma	AsthmaticTenden	Chronic
Thread	0-5	42	9	18	15
Formation	>5	18	3	12	3
Spinning	0-5	54	6	36	12
	>5	30	3	15	12
Weaving	0-5	66	12	36	18
	>5	24	3	15	6
Knitting	0-5	72	6	54	12
	>5	18	3	9	15
Bleaching	0-5	54	9	33	12
	>5	24	9	15	00
Dyeing	0-5	48	9	30	9
	>5	06	00	3	3
Printing	0-5	48	6	30	12
	>5	00	0	0	0
Finishing	0-5	36	9	21	6
	>5	00	0	0	0

Table 4 Hand Grip Meter Test of Workers

Category Of Workers	Years Worked In Present Unit	Number Of Workers	Hand Grip Meter					
			Above Normal		Normal		Below Normal	
			Right	Left	Right	Left	Right	Left
Thread	0-5	42	3	3	0	6	21	9
Formation	>5	18	0	0	0	0	12	6
Spinning	0-5	54	4	9	0	9	12	20
	>5	30	0	6	3	3	12	6
Weaving	0-5	66	0	0	6	3	36	21
	>5	24	3	3	3	3	12	0
Knitting	0-5	72	9	0	6	6	30	21
	>5	18	0	0	6	6	6	6
Bleaching	0-5	54	1	1	2	3	7	4
	>5	24	0	0	0	0	5	1
Dyeing	0-5	48	2	1	3	2	5	3
	>5	06	0	0	1	0	1	0
Printing	0-5	48	2	1	2	1	7	3
	>5	00	0	0	0	0	0	0
Finishing	0-5	36	9	3	3	3	12	6
	>5	00	0	0	0	0	0	0

Table 5 Eye Problems Reported By Workers

Category of workers	Years worked in present unit	Number of workers	Eye Problems								
			H	M	W	S	C	E	St	N	
Thread	0-5	42	9	12	3	0	0	0	0	0	18
Formation	>5	18	6	9	0	0	0	0	0	0	3
Spinning	0-5	54	3	6	0	0	0	6	0	0	39
	>5	30	6	6	0	0	9	0	0	0	9
Weaving	0-5	66	9	6	3	3	6	0	0	0	39
	>5	24	6	6	0	0	9	0	0	0	3
Knitting	0-5	72	15	6	6	0	0	0	0	0	45
	>5	18	6	6	0	0	9	0	0	0	3
Bleaching	0-5	54	3	9	0	0	0	0	0	0	45
	>5	24	3	3	0	0	9	0	0	0	3
Dyeing	0-5	48	6	6	3	3	3	3	0	0	24
	>5	06	3	0	0	0	3	0	0	0	0
Printing	0-5	48	6	6	3	3	3	3	0	0	24
	>5	00	0	0	0	0	0	0	0	0	0
Finishing	0-5	36	3	6	0	0	0	0	0	0	27
	>5	00	0	0	0	0	0	0	0	0	0

Table 6 Pains Reported By Workers

Category of workers	Years worked in	Number of workers	Pain									
			B	J	K	E	LA	C	RS	RA	L	H
Thread	0-5	42	3	2	0	0	2	1	1	1	0	0
Formation	>5	18	2	0	0	0	0	0	0	2	0	0
Spinning	0-5	54	4	3	1	1	1	1	0	0	0	1
	>5	30	2	2	0	0	0	1	0	1	0	0
Weaving	0-5	66	4	4	3	1	3	1	1	1	1	1
	>5	24	2	0	2	0	0	2	0	0	0	0
Knitting	0-5	72	6	2	1	2	1	2	1	1	1	1
	>5	18	2	2	2	0	0	0	0	0	0	1
Bleaching	0-5	54	3	1	1	1	0	0	0	0	1	1
	>5	24	1	1	1	0	0	0	1	1	0	0
Dyeing	0-5	48	3	1	0	0	0	1	1	1	1	2
	>5	06	1	0	0	0	0	0	1	0	0	1
Printing	0-5	48	3	3	1	1	1	0	2	0	0	2
	>5	00	0	0	0	0	0	0	0	0	0	0
Finishing	0-5	36	9	6	0	6	3	0	3	3	3	3
	>5	00	0	0	0	0	0	0	0	0	0	0