Original Research Paper

Volume : 5 | Issue : 10 | October 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Visual and Musculoskeletal Problems Among Sewing Machine Operators in A Readymade Garment Industry

Science

KEYWORDS : Musculoskeletal Disorders, Sewing Machine operators, Garments Industry, Visual fatigue

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ABSTRACT

The present investigation was carried out to study the effect of sewing machine operation and work station design on visual and musculoskeletal problems of sewing machine operators by gender and describe working conditions. The study was a comparative cross-sectional study of musculoskeletal and visual symptoms in 100 sewing machine operators, an age and gender matched control group. Compared to control group a significant higher proportion of the subjects experienced visual fatigue, burning/ tearing, neck pain, shoulder pain, wrist pain and lower back pain. A statistically significant difference between males and females was observed in visual fatigue, blurred vision, double vision, neck pain, elbow pain, wrist pain and finger pain. Blurred vision and double vision were common in males, while the rest of the symptoms were not common in females. Two thirds of the work stations observed were found to be inappropriate. The posture adopted by the operators was unsatisfactory. Operation of sewing machine in readymade garment industry was found to be associated with occurrence of visual and musculoskeletal symptoms. Suitable workstation design in the garment industry is recommended to ensure safety to workers.

INTRODUCTION

Garment industry is one of the most important strategic industries which constitute about 7% of total industrial production in the world and 8.3% of the total trade in industrial materials. The industry occupies more than 14% of the total labour force in the world. It employs about 40 million people in various countries of the world. People working in these industries are more prone to musculoskeletal disorders (MSDs). The work environment in a majority of these units is unsafe and unhealthy. MSDs are disorders of the muscles, tendons, ligaments, joints and cartilage and nervous system. It affects nearly all the body parts including arms, back, hands and legs. People who do continuous repetitive work in fixed static positions are more susceptible to experience MSDs. Evidences from a number of studies suggest that all these disorders principally result from constrained working postures, monotonous and repetitive work. William [1] found that muscle pain is often experienced by workers who do continuous and repetitive work. Pascal did a study on MSD in computer operators and reported that static posture increases the risk of work related MSDs, whereas varied posture and rest periods may lower the risk of MSDs [2]. In a readymade garment industry, the sewing machine operators sit continuously in same position and the nature of their work is repetitive. The strain on eyes is more as their work involve continuous visual inspection and visual movement.

The health risks that these sewing machine operators face come from more suitable hazards whose effect accumulates over time. Sewing machine operators face substantially higher risk of visual strain and the frequency of persistent neck, wrist and shoulder injuries increases with years of employment [3]. Sewing machines as with any other machinery or equipment when used properly do not cause adverse effects for the operator. However, they can contribute to significant health and safety problems if they are used improperly or are poorly matched with the operator. Fitting the workplace and working conditions to the physical and mental needs of sewing machine operator can be one of the solutions to escape from some of the symptoms such as eye strain, lower back, neck and shoulder pain. These problems adversely affect the workers quality of life, efficiency of work and results in decreased productivity [4].

An ergonomically designed work place would ensure that a taller worker had enough space to safely perform his or her job, and also that a shorter worker would reach all of his or her tools and products without reaching beyond a comfortable and safe range. The opposite to this, and what typically happens in the work place, is that a worker is forced to work within the confines of the job or work station that is already in place. This may require employer to work in awkward postures, perform the same motion over and over again which would cause work related musculoskeletal disorders (WMSD).

An assessment of visual and musculoskeletal problems in sewing machine operators was not explored. Hence a research into sewing machine operator is important and this study was carried out to determine the effect of sewing machine operation and to evaluate the work station of those operators in a readymade garment factory.

METHOD

This was a comparative cross sectional study of musculoskeletal and visual symptoms in sewing machine operators in a readymade garment factory, an age and gender matched control group. The workstations, postures of 25 sewing machine operators were also assessed. It was initially planned to assess the workstations of all sewing machine operators who participated in the study, but this was not possible due to limited access to workstations.

2.1. Study Population

The study sample consisted of 100 sewing machine operators from two readymade garment industries located in Tripura, the seventh largest city in Tamilnadu, India. The names of the industries are not revealed in the study. Initially when the researcher approached the garment factories management, they were not willing to participate in the study. Finally on persuasion the management permitted the researcher to conduct the study on a condition, that their names will not be revealed anywhere. After the interview, participants were educated on ergonomic principles. The exclusion criteria were: age below 20 and above 59 years, diagnosis of arthritis, osteoporosis and rheumatism

duration of employment less than 6 months duration of sewing machine operation less than 4 hours per day.

2.2. Control group

The control group consisted of 100 employees in the readymade garment factory who did not use sewing machine, were holding desk jobs were selected. Those who were doing manual labour were excluded from the study.

2.3. Study Instruments

A questionnaire was developed to identify visual and musculoskeltor symptoms. The researcher administered this questionnaire for both sewing machine operators and control group.

A checklist to assess ergonomic and working conditions of sewing machine operators was developed to evaluate the work station and posture of the sewing machine operator. The participants were assessed while working at workstations.

RESULTS

3.1. Socio demographic characteristics

Mean age of the sample was 29.9 years with a standard deviation of 9.094 and the mean age of the control group was 29.6 years with a standard deviation of 8.069. The majority (73%) in both sewing machine operators and control group were in the age group of 21- 30 years. Sixty eight percent of the sewing machine operators and fifty five percent of the control group were unmarried. Majority of the sample in both the groups i.e sewing machine operators (60%) and control group (58%) were females.

3.2. Employment details

The sewing machine operators in the readymade garment factory work continuously on the sewing machine for about six hours, with few short breaks for tea and lunch in between. The stitching skill was assessed with the feedback collected from the supervisor through a structured questionnaire based on the quality of the end product. This stitching speed was measured based on the number of finished products produced in an hour. Employment details were given in Table. 1

Table 1. Employment details

Details	% (n=100)
Duration of work (years)	
Less than 1	33.0
1-5	37.0
6-10	26.0
> 10	4.0
Number of hours at sewing machine per day	
4-6	92.0
≥ 6	8.0
Stitching skill	
Excellent	76.0
Average	20.0
Below average	4.0
Mean stitching speed by gender finished products per hour	
Male	1.4
Female	1.8
All	1.6

3.3 Visual and musculoskeletal symptoms

A significant higher proportion of sewing machine operators had the following symptoms compared to the control group; visual fatigue, burning/ tearing, neck pain, shoulder pain, wrist pain and lower back pain. Table. 2 summarize the frequency of symptoms experienced by the study and control groups. The commonest symptom in sewing machine operator was visual fatigue, while the control group commonly reported headache.

In assessing musculoskeletal symptoms of the neck and upper limbs, reported symptoms were categorized according to the sideness; right side, left side, both sided and central. Those with shoulder pain 36(75% n= 48) reported pain to be on the right side. Twenty six (51% n=51) of those with neck pain said the pain was central. Out of 26 sewing machine operators with wrist pain, 18 said the pain was on the right side.

Table. 2. Prevalence and comparison of visual and musculoskeletal symptoms in sewing machine operators and control group

Symptom	Sewing machine operators % (95% CI)	Control % (95% CI)	SND (P value)
Headache	53.0 (43.2-62.8)	46.0 (36.2-55.8)	1.000 (P >0.05)
Visual fatigue	75.0 (66.5-83.5)	30.0 (21.0-39.0)	7.137 (P <0.05)
Blurred vision	22.0 (13.9- 30.1)	21.0 (13.0-29.0)	0.172 (P >0.05)
Double vision	7.0 (2.0-12.0)	7.0 (2.0-12.0)	-
Burning/ Tearing	35.0 (25.7-14.3)	16.0 (8.8-23.2)	3.158 (P <0.05)
Dry eyes	14.0 (7.2-20.8)	8.0 (2.7-13.3)	1.362 (P >0.05)
Itchy eyes	13.0 (6.4-19.6)	11.0 (4.9-17.1)	0.435 (P >0.05)
Neck pain	51.0 (41.2-60.8)	15.0 (8.0-22.0)	5.860 (P <0.05)
Shoulder pain	48.0 (38.2-57.8)	16.0 (8.8-23.2)	5.165 (P <0.05)
Arm pain	11.0 (4.9-17.1)	0.0	-
Elbow pain	8.0 (2.7-13.3)	8.0 (2.7-13.3)	-
Fore arm pain	5.0 (0.8-9.2)	3.0 (0.7-5.3)	0.723 (P >0.05)
Wrist pain	26.0 (17.4-34.6)	11.0 (4.9-17.1)	2.784 (P <0.05)
Finger pain	17.0 (9.6-24.4)	11.0 (4.9-17.1)	1.227 (P >0.05)
Numbness in hand	16.0 (1.4-10.6)	0.0	-
Tingling in hands/ fingers	10.0 (4.1-15.9)	12.0 (5.6-18.4)	0.452 (P >0.05)
Lower back pain	49.0 (39.2-58.8)	26.0 (17.4-34.6)	3.458 (P <0.05)
Tingling in legs/ feet	6.0 (1.4-10.6)	8.0 (2.7-13.3)	0.555 (P >0.05)

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3.4. Gender

A statistically significant difference between males and females was observed in the following symptoms: visual fatigue, blurred vision, double vision, neck pain, elbow pain, wrist pain and finger pain. Blurred vision and double vision were more common in males, while the rest of the symptoms were more common in females. Table 3. shows the symptoms which have significant difference by gender.

Table. 3. Significant difference in symptoms by gender (p value < 0.05)

Symptom	% of sewing machine operators		SND
	Male n_1= 40	Female n_2= 60	
Visual fatigue	60.0 (50.4-69.6)	8.5 (78.0-92.0)	4.15
Blurred vision	42.5 (32.8-52.2)	8.3 (2.9-13.7)	6.04
Double vision	12.5 (6.0-19.0)	3.3 (0.8-5.8)	2.44
Neck pain	42.5 (32.8-52.2)	56.7 (47.0-66.4)	2.03
Elbow pain	2.5 (0.5-4.5)	11.7 (5.4-18.0)	2.55
Wrist pain	15.0 (8.0-22.0)	33.3 (24.1-42.5)	3.10
Finger pain	5.0 (0.8-9.2)	25.0 (16.5-33.5)	4.12

3.5 Workstation

The total marks allocated for the workstation was 30. The mean of the marks given to the 25 workstations observed was 19.96 (66.5 %). Over two thirds (16 out of 25) of the workstations scored below 50% for the work table while all workstations scored above 50% for the sewing machine (Table 4).

Table 4. Distribution of percentage of marks allocated to workstations

Workstation component	Number of workstations N= 25	
	< 50 % marks	> 50% marks
Sewing machine	0	25
Work table	16	9
Chair	6	9
Visual environment	6	19

3.6. Posture

The sewing machine operators were observed for conformity with the recommended standard (Table 5). This was best seen in straightness of back.

Table 5. Posture of the study sample

Characteristics of the posture	N	Percentage %
Back straight	19	76.0
Lower back supported	2	8.0
Head and neck straight and in line	9	36.0
Upper arms and elbow close to the body	13	52.0
Forearms and arms are at right angle	15	60.0
Forearms and wrists are parallel to the floor	7	28.0
Forearms, wrists and hands are straight and in line	17	68.0
No sideways movement of wrist	10	40.0
Thighs are parallel to the floor	0	00.0
Feet are flat on the ground or on a firm foot wrist	11	44.0

DISCUSSION

Visual fatigue, burning/ tearing of eyes, neck pain, shoulder pain, wrist pain and lower back pain were significantly higher in sewing machine operators compared to the control group. Workers of different ages were working in readymade garment industry. The prevalence of visual fatigue was 75% (95% CI= 66.5-83.5). A previous study found the same prevalence of visual symptoms in information technology in India [5]. Most of the workers were females. In the present study, it was found that a high prevalence of musculoskeletal problems among sewing machine operators. These workers suffer from musculoskeletal disorders, which have been attributed to poor working postures as well as to the repetitive hand and arm movements. Their posture restrained by both visual and manual aspects of the task, the design of the sewing machine and table have a considerable influence on the posture adopted. Musculoskeletal disorders in the neck and shoulder region are frequent among workers performing monotonous highly repetitive and high precision tasks [6] [7].

Blurred vision and double vision were common in males, while visual fatigue, neck pain, elbow pain, wrist pain and finger pain were common in females. This is in accordance with previous studies, where females were found to experience significantly more musculoskeletal symptoms and a twofold increased risk of developing for arm pain [5].

In this study, an age and gender matched control group was drawn from the same location as the study subjects. Therefore, it was possible to identify the symptoms where a true difference existed between two groups.

In this study, the work stations were observed and evaluated in the same manner by the same observer. A difficulty was faced as only 25 workstations could be assessed due to difficulties in accessing the workstations due to refusal from the clients due to tight schedule as well as apprehension, even after being assured of confidentiality. Majority of the workstations scored less than 50% for work table while all workstations scored above 50% for the sewing machine. The characteristics of the sewing machine conformed better to the recommended standards compared to the work table. The posture was unsatisfactory except for straightness of back and position of forearms and wrists.

CONCLUSION

Musculoskeletal problems are very extensive in garment industries and it's a great challenge to extinguish this problem. Proper steps should be taken to improve the situation. There is a need to find out the main causes for musculoskeletal disorders and suggest recommendations which could be very helpful in mitigating the musculoskeletal problems and improving the sewing section of the garments industry. In India, garment sector is one of the major export sector and a main source of foreign exchange. So if the musculoskeletal problems in the garments industry can be reduced, this sector will be much more lucrative.

From the previous results it was observed that most of the factories of the garment industry do not stick to the standard specifications in the work place which forces the worker to sit by till the end of the shift and he is not even allowed to complain of the inadequacy of the place or he will be subjected to harassment especially in private sector. As a result of these circumstances, ready- made garment industry has become expelling employment as a result of bad work conditions. Thus, these conditions and nature of work should be improved. It is recommended to apply a systematic process to identify and resolve the problems of work environment. Engage workers in determining the workplaces threats, classification and participation in resolving these problems. This leads to great success of design solutions and gives the worker motivation and satisfaction of the workplace.

REFERENCES

1. William, T, S., (1997). Cumulative trauma disorder: Skeletal Muscle Dysfunction, NIOSH; U.S. Department of Health and Human Services.

2. Pascal, M., (2003). Standardizes Low –Load Repetitive Work: Evidence of different Motor control Strategies between Experienced Workers and a Reference Group. www. Informedesign, Umn edu.
3. Schibye, B., Skovt, T., Ekner, D., Christiansen, J, U., Sjoggard, G. (1995). Sc and J Work Environment Health. 21(6): 427-434.
4. Nag, A., (1996) Women in industry - Repetitive work and postural stress. In: Nag PK, (Ed). Ergonomics and work design - Emerging issues in organizational sciences. New Age International Pvt. Ltd: New Delhi.
5. Sharma, A, K., Khera, S., and Khandekar, J. (2006). Computer related health problems among information technology professionals in Delhi, Indian journal of community Medicine, 32 (1); 36-38.
6. Punnett, L., Robins, J, M., Wegman, D, H., Keyserling, W,M .(1989). Soft tissue disorders in the upper limbs of female garment workers. Scand J work Environ Health, 15 (1); 75-80.
7. Vihma, T., Nurminen, M., Mutanen, P. (1982). Sewing- machine operators' work and musculoskeletal complaints, Ergonomics, 25(4); 295-298.