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Work, Workspace Organisation and Body Discomforts of Women Working in Tailoring Units

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Abstract: **Tailoring industry is one of common small-scale service sector where women, belonging to the low-income groups are employed in large numbers. Work related musculoskeletal disorders are one of the greatest occupational health concerns of these women today. Studies have proved that due to working in a constant and iterative position, injuries occur in shoulder, neck, back, and lower extremities of sewing machine operators. This study was done to assess the work, work space organization and the extent of bodily discomfort experienced by the women working in tailoring units. An interview schedule was used to collect information regarding the worker characteristics. 200 samples were selected for baseline assessment and out of the total, 50 samples were selected after Body Discomfort mapping for Posture analysis. A body part discomfort map was used to identify discomfort in the different body parts. Technique applied for postural analysis of work-related musculoskeletal risk factor was Rapid Upper Limp Assessment method. The study found that tailoring women were suffering from work related musculoskeletal problems, as evidenced by the occurrence of low back pain, perceived fatigue and occupational stress. Preventive measures need to be adopted to eliminate body discomfort and maintain good posture, thereby increase in productivity**

Index Terms: **Body Discomfort, Posture, Tailoring, Work, Work Space Organization**

I. Introduction

In Kerala, tailoring industry is one of common small-scale service sector where women, belonging to the low-income groups are employed in large numbers. As per the Kerala Tailoring Workers Forum, the members include those who working as tailors, embroidery workers and self-employed tailors. A vast majority of women working in this industry serve as sewing machine operators. Although the sewing process could provide a qualitative improvement and a flexible work style to the worker when it is treated as a whole, the individual in the workplace is limited by the simple and repetitive tasks. The activity at the sewing machine with its high motion sensitivity and difficult gripping positions, requires advanced sensorimotor skills and configuration knowledge based on the nature of the fabric and the sewing steps. The physical burden in the sewing process is considerably high due to sitting in a fixed position constantly because of the sight requirements at the machine, leading to a static burden that threatens the health of the worker (Erensal, 1987). Bodily discomfort means a state ill health. It is closely related with fatigue both physical as well as mental. It is a painful state which can follow unsuitable work stress, psychological or sociological conflict and finally ill health. Location of bodily discomfort is related to the task or seems to occur by virtue of job (Sharma, and Sharma (1992).

II. Objectives of the Study

- Assess the socio-economic background of women working in tailoring units.
- Assess their work and work space organization.
- Find out the extent of body discomfort experienced by the women working in tailoring units.
- Assess the work posture and suggest recommendations.

III. Literature Review

A. Work space Organization

The quality of the design of the work place in terms of the task and the worker has an important effect on the ease with which the action is achieved. The basic component of work places are the work surface, storage, and major appliance or equipment. For many tasks all three components are essential to satisfy the needs of the task and worker. The organization and arrangement of work centers are required for minimizing

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of time, attention, dissatisfaction and energy (Gandotra,et al 2005)

B. Bodily Discomfort

Gemaidy and Karwanski (1993) investigated the discomfort associated with joint postures which deviated from the neutral position Similarly pain in the back is one of the most common sources of work-related discomfort. It can occur as a result of many every day activities. Roy et al (1989) reported that the lumbar muscles of chronic low back pain suffer fatigue more rapidly than those of no suffers. He used median frequency analysis of the EMG signal to investigate lumber muscle fatigue in chronic low back pain sufferers and in normal. Agarwal and Sharma, 2001 conducted a study on muscular stress of women workers in food processing industry and found that muscular strength during washing was significantly higher than cutting. It was higher while peeling than cutting. Repeated or sustained activities, rapid movements, and large forces can stimulate pain receptors in a muscle. Kroemer and Grand jean (1997) opine that fatigue symptoms are both subjective and objective, the most being: - the subjective feeling of weariness, somnolence, faintness and distaste for work, sluggish thinking, reduced alertness, poor and slow perception, unwillingness to work, decline in both physical and mental performance.

C. Work Posture

Industrial sewing is an action that takes place in a seated position. The purpose of using a chair to sit is to decrease or eliminate physical energy consumption and tiredness. On the other hand, if the seated posture is not correctly supported, intense muscular-skeletal stresses will result. Muscular-skeletal stresses occur mostly around the waist, while sitting. When the individual changes his/her position from the standing posture to a normal sitting posture, the pelvis rotates backward. The rotation of pelvis causes the backbone to flatten approximately 25-38^{o}. The flattening of the backbone creates a stress on the lumbar discs, the posterior ligaments and the spinal nerves. When the spinal inclination flattens, the pressure on the lumbar discs increases approximately 35%, and the nucleus causes an opposite force on the lumbar discs. In the case of chronic charge, the combination of these two forces leads to a gradual internal trauma, and causes the fibers of connective tissue to sag then narrow (Yu and Keyserling, 1989).

IV. Materials and Method

This cross-sectional study was carried out among 200 women tailors between the age group of 20-60 years who volunteered to participate in the study, were purposively selected from Changanasserry Tehsil of Kottayam District in Kerala. Baseline assessment like age, sex, height, weight and experience, work organization and body discomfort mapping were done for all the respondents. Out of this 50 samples who reported severe body discomforts were selected for posture analysis. The purpose of the study was informed and approved consents were obtained from all the participants.

1) Tool used for study

An interview schedule was used to collect information regarding worker characteristics and work organization.

2) Discomfort Mapping

A body part discomfort map (Corlett & Bishop, 1976) was used to identify discomfort in the different body parts. Corlett and Bishop's Body part Discomfort scale is a subjective symptom survey tool that evaluates the respondent's direct experience of discomfort at different body parts .Subjects were asked to rate the zone of maximum discomfort.

3) Postural Analysis

Technique applied for postural analysis of work related musculoskeletal risk factor was Rapid Upper Limb Assessment Method(RULA) suggested by McAtamney and Corlett (1993). According to McAtamney, *et al*. RULA (Rapid Upper Limb Assessment) is a survey method developed for use in ergonomics investigations of workplaces where work-related upper limb disorders are reported. This tool requires no special equipment in providing a quick assessment of the postures of the neck, trunk and upper limbs along with muscle function and the external loads experienced by the body. A coding system is used to generate an action list, which indicates the level of intervention required to reduce the risks of injury due to physical loading on the operator.

4) Data Analysis

Data analysis was done with SPSS software to analyze the influence of the variables like age, height, weight and experience of workers on RULA. To find out the relationship between dependent variable and independent variable co-efficient of co-relation was used.

V. Findings of the Study

A. Socio Economic Status of the Respondents

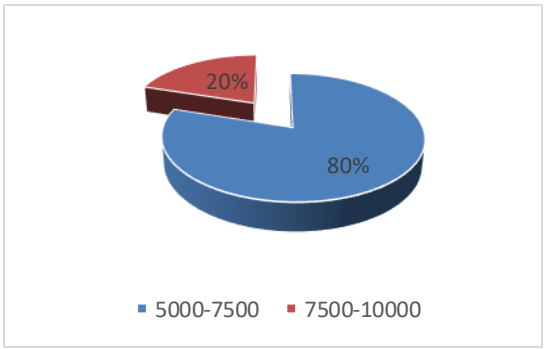

Fig.1. Income earned per month

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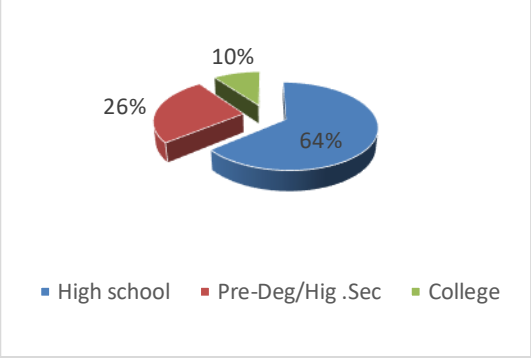

Fig.2. Education of the respondents

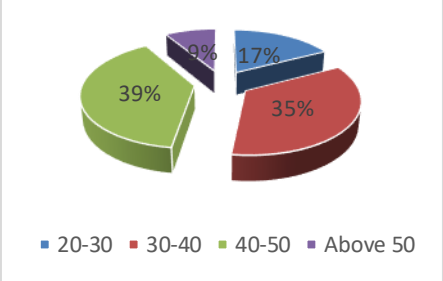

Fig. 3. Age of the respondents

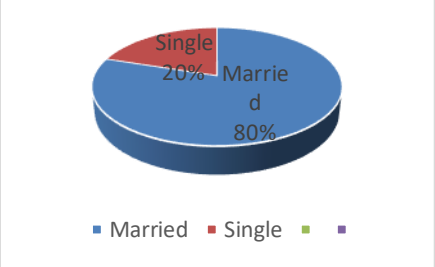

Fig.4. Marital status of the respondents

B. Assessment of Work Organisation and Work Space Design

Table -I Work organisation of the respondents

Details		Number	Percentage
Years of Experience (Years)	<5	32	16
	5-10	88	44
	10-20	48	24
	Above 20	32	16
Duration of work (Hours)	< 7	28	14
	8 or more	172	86
Take break during work	Yes	116	58
	No	84	42
Break of fixed duration	Yes	106	53
	No	94	47
Working pattern	Alone	40	20
	With others	160	80

Dul J and Weerdmeester B (2008) suggests that flexible forms of organisation like performance of part of work activity at home instead of work place, making work times and resting hours more flexible, autonomous work groups and better labour relations can contribute to higher productivity, higher quality and more innovations. The assessment of work organization revealed that forty four percent have work experience 5-10 years, 24 percent had 10-20 years and 16 percent of them had above 20 years of experience and another 16 percent had been working in tailoring units for less than 5 years. Hours of work are the time that an employee is at the disposal of the employer. Hanecke et al (1998) suggests that there is interaction between the hours of work and time of time of work and working time should be 7-8 hours and, it should start early in the morning to minimize accidents and for peak performance. On an average eighty six percent of the subjects spend around 7-8 hours a day for work. Around 58 percent of them took break while working. Working pattern showed that 80 percent of them work along with others while 20 percent worked alone in their homes. More than 50 percent had the habit of taking a break at noon time, while forty two percent didn't want to take break as they want to finish the job as early as possible and go home early.

Table-II Work space design

Factors	Yes	No
Having sufficient space to work	114(57)	86(43)
Work space permits stable neutral posture	106(53)	94(47)
Work motorized	132(66)	68(34)
Seat height adjustable	_	200(100)
Chair have back rest	84(42)	116(58)
Work surface appropriate for visual and manual requirements	144(72)	56(28)
Use foot rest while working	200(100)	-
Use lumbar pads	100(50)	100(50)
Use arm rest	64(32)	136(68)

(N=200)

An ergonomically appropriate working environment designed as per the needs of the workers determines the conditions that require minimum power for the task by minimizing the forces on the user. On the other hand, improperly designed equipment causes the aches and symptoms around the shoulder, neck, nape and waist, and to the problems with the muscle and skeleton systems (Kalınkara et al., 2001). Work space plays a major role in the productivity and perfection of the work done, by rearranging the working environment the productivity can be maximized by enabling comfortable conditions to the worker. In order to assess the work space a quick exposure checklist was used as it quickly exposes the working condition of women tailors like work related difficulties, workplace design. The

assessment of work space of the respondent revealed 57 percent of the workers had sufficient space to work and almost same percent agreed that they could maintain good posture at work while 43 percent of them didn't have sufficient space to work. When 66 percent of the women used motorized machines for stitching, 34 percent stitched using pedal machine. The seat which they used were not adjustable for all of the them. Only 42 percent had back rest for their chair. The work surface was sufficient for the work for 72 percent of them and all of them used foot rest of the machine while working. 50 percent of them used lumbar pads to support lower back. Only 32 percent had arm rest for their chair.

C. *Assessment of Body Discomfort*

Table-III Body part experiencing discomfort while working

Body Parts	Discomforts				
	ND	MD	MOD	SD	ED
Headache	70 (35)	50 (25)	40 (20)	25 (12.5)	15 (7)
Neck	72 (36)	34 (17)	28 (16)	30 (15)	36 (18)
Shoulder	106 (53)	23 (11)	29 (18)	22 (11)	20 (10)
Upper arm, Elbow	188 (94)	8 (4)	_	4 (2)	_
Fore arm	196 (98)	_	_	4(2)	_
Lower Back	44 (22)	22 (11)	76 (38)	40 (20)	18 (9)
Upper leg	152 (76)	8(4)	32 (16)	8 (4)	_
Lower Leg	16 4(82)	8(4)	8(4)	20 (10)	_

Discomforts: ND-No Discomfort, MD - Mild Discomfort, MOD- Moderate Discomfort, SD- Severe Discomfort, ED-Extreme Discomfort

To assess the musculoskeletal discomfort experienced by the women tailors Body Part Discomfort Scale (Corlett, E. N. & Bishop, R. P. (1976)) was used. Musculoskeletal discomfort survey collected information on the location of discomfort with reference to specific body regions using whole body diagrams that designate specific regions to be assessed. Participants were asked to point out the body parts on the chart and rate the severity of discomfort. Severe discomfort in the lower back of the body was reported by 20 percent of the workers. Less than 40 percent of the respondent experienced mild to moderate discomfort at various body parts, with 38 percent reported to have moderate discomfort at the lower back region of the body. Body part experienced extreme pain was shoulder, neck, and lower back and that too by very few percent of the respondents.

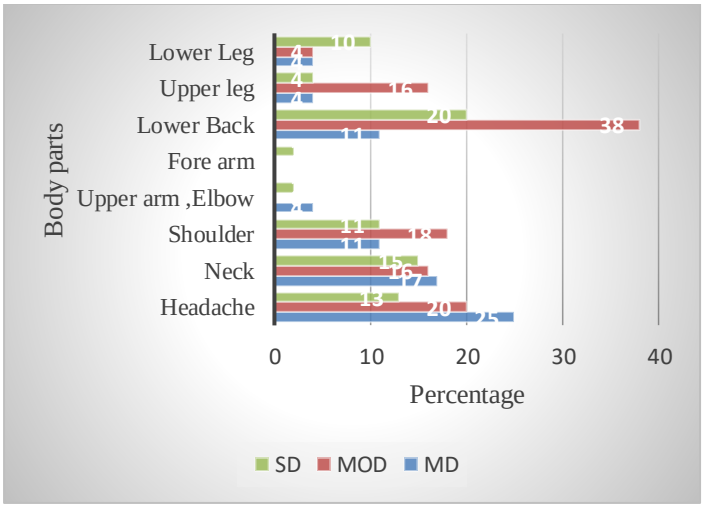

Fig.5. Body parts experiencing discomfort

D. *Assessment of Posture*

Rapid Upper Limb Assessment (RULA) was used to evaluate the exposure of individual workers to ergonomic risk factors associated with upper extremity musculoskeletal disorder. The RULA ergonomic assessment tool considers biomechanical and postural load requirements of job tasks/demands on the neck, trunk and upper extremities. A single page worksheet was used to evaluate required body posture, force, and repetition. Based on the evaluations, scores were entered for each body region in Section A for the arm and wrist, and Section B for the neck and trunk. After the data for each region is collected and scored, tables on the form are then used to compile the risk factor variables, generating a single score that represents the level of musculoskeletal disorder risk.

Table-IV RULA scores

Score	Meaning	Group
1 – 2	Acceptable posture	1
3 – 4	Further investigation and change may be needed	2
5 – 6	Further investigation and change soon	3
7	Investigate and implement immediate change	4

Table-V Percentage of subjects in each group

Group	Number	Percentage
1	16	32
2	27	54
3	7	14

Using RULA work sheet the postures were evaluated for fifty selected samples for finding the severity of the problem. It

consists of two areas for assessment of whole body which is divided into two parts as -Upper arm, lower arm, wrist, wrist twist and the angle at which they are working were recorded by taking photographs. Evaluation of the postural analysis revealed that fifty four percent of the workers maintained a body posture which require further investigation and may need change and for fourteen percent they had to change their posture soon to avoid discomfort, while thirty two percent maintained acceptable posture.

Table-VI Correlation of age of the respondent with RULA

		Age	RULA
Age	Pearson correlation Sig(2 tailed)	1	-.3*
RULA	Pearson correlation Sig(2 tailed)	-.3*	
	N	50	50

* Correlation is significant at the 0.05 level(2-tailed)

The correlation of age of the respondents with RULA scores is negative, indicating age is not a factor for body discomfort.

Table-VII Correlation of age, income and experience

		Age	Income	Experience
Age	Pearson correlation Sig(2 tailed) N	1 50	.233 .104 50	.679** .000 50
Income	Pearson correlation Sig(2 tailed) N	.233 .104 50	1 50	.501** .000 50
Experience	Pearson correlation Sig(2 tailed) N	.679** .000 50	.501** .000 50	1 50

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation between age and income is 0.233 which is not significant, which means they are independent. Correlation between age and experience r = 0.679, which is positively correlated at 1 % level.

VI. SUGGESTIONS

- The study recommends that tailoring women should adopt different safe postures without compromising the work. Seat height adjusting chairs can prevent back bending and can provide stable body posture to a certain extent.
- Seat should have backrest and must provide support for the lower back to reduce postural strain and low back pain which is likely to result in the long run without any back support.
- Seat surfaces should be lightly padded, covered with non-slippery material and with a "waterfall" edge at the front.
- Taking rest in between can help in checking lower back pain and pain in the muscles in the neck and shoulders.
- As the pace of work, working arrangements may be tailored as per individual requirements and each worker must have an understanding of her own work and learn new skills through interpersonal enrichment.

CONCLUSION

The study found that tailoring women were suffering from work related musculoskeletal problems, as evidenced by the occurrence of body discomforts Preventive measures need to be adopted to eliminate body discomfort and maintain good posture, thereby increase in productivity. It was observed that the study group was unaware of efficient, safe and comfortable work place design. Hence an effective application of ergonomics in work place design, seating arrangement, environment is essential to achieve a balance between worker characteristics and task demands. This can enhance worker productivity, provide worker safety, physical and mental well-being and job satisfaction.

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